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The main focus of this project was the improvement of the understanding of spoken language by lower class kindergarten children. Thus, the project was concerned with (1) identifying areas in which young children are deficient in listening skills, (2) preparing and evaluating instructional programs for the improvement of these skills, and (3) testing under classroom conditions a hypothesis regarding the value of having children speak aloud in developing listening and comprehension skills. Six studies were conducted to obtain information on the pupils' deficiencies, to use the programs constructed to improve the deficiencies, and to investigate the hypothesis. Several of the six studies used subjects other than lower class kindergarten pupils for control or comparison purposes. The results of the studies indicated that (1) lower class children use a restricted language code, especially with regard to function words, and (2) instructions to verbalize and the subsequent overt responses have measurable value where there is a direct correspondence between the stimulus and the verbal response. However, the effect of oral responding was much less clear when the material was more complex. An important contribution of this project to education was the development and evaluation of a number of replicable instructional programs accompanied by criterion test items. (WD)

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FINAL REPORT

Project No. 6-1111

Contract No. OE-6-10-360

THE VALUE OF THE SPOKEN RESPONSE IN TEACHING LISTENING SKILLS TO YOUNG CHILDREN THROUGH PROGRAMMED INSTRUCTION

January 1969

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The Value of the Spoken Response in Teaching Listening Skills to Young Children through Programmed Instruction

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University of California
Los Angeles, California

January 1969

The research reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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THE VALUE OF THE SPOKEN RESPONSE IN TEACHING LISTENING SKILLS TO YOUNG CHILDREN THROUGH PROGRAMMED INSTRUCTION

SUMMARY

Problem

The central purpose of this investigation was to determine how much kindergarten children can profit from speaking out loud during instruction designed to teach them to listen and to understand orally-presented information. The study was also directed at throwing greater light on the use of programmed instruction in developing young children's listening skills involving certain function words.

The rapidly increasing number of studies dealing with the acquisition of language by young children has focused attention upon the relationship between speaking the language and understanding it. In particular, several studies have highlighted the importance of the period from ages four to seven for language acquisition. During this interval the young child learns not only to speak and to understand, but to listen to his own speech. In this process of learning to understand and listen, the role of speaking may be of critical importance. The question then is whether young children can profit by speaking aloud when they are learning to understand what they hear.

Another way of approaching this question is in terms of the issue of overt versus covert responding, which has received so much attention in recent years. The investigation, therefore, may also be looked upon as a study of response mode with young children. Although there has been a large amount of research on this question, the vast majority of the studies have failed to find any value in instructing the students to respond overtly; having the students "think" the answer to each frame appears to be enough.

Since the subjects involved in these experiments have invariably been much older, usually at the secondary or adult levels, such findings do not preclude the possibility that an overt, spoken response is critically important with young children. There is some evidence that young children do profit from overt speaking, with the facilitating effect diminishing with age. While it is possible that preschool children can learn to understand information simply by "listening carefully", it seems likely that they would profit far more by the requirement that they speak out loud. This process may be related to that of the internalization of speech, which begins with overt speaking behavior and concludes with silent speech. The work of Vygotsky and Luria, for example, has

indicated the intimate relationship between overt speech and thinking. By systematically providing for this type of language practice the child may be helped to acquire an ability to process information and thus demonstrate an understanding of what has been said.

To achieve this objective, instructional materials were designed to capture the imagination of the child, provide pleasurable activities and yet be practical for use in the regular classroom. The program was prepared so as to be highly replicable; the commentary was prerecorded on magnetic tape, and included programmed picture books as well as carefully sequenced games with manipulanda. In this way it was possible to assess the value of requiring overt speaking responses during programmed learning with young children under classroom conditions with a precision approaching laboratory standards.

Hypothesis

It was the purpose of this investigation to determine the value of having young children speak out loud during programmed instruction designed to teach them to listen and to understand new information dealing with conceptual rules and subject content. A subsidiary purpose was to develop programmed materials to introduce new language curricula with this lower class population of young children.

The Studies

Following the introduction and review of the literature in Chapter 1, there are six chapters each of which reports a separate but related study.

To examine Bernstein's hypothesis that children from deprived environments show a deficiency in their understanding and use of function words, the first study (reported in Chapter 2) used a test of immediate memory over three word classes: nouns, verbs, and function words. The subjects were 60 children in kindergarten, first, and second grades, from both lower and middle class homes. Following a digit span test format, this instrument required children to repeat increasingly longer lists of words. While compared to the middle class group the lower class children were inferior on each word class, the deficiency was significantly greater with the function words, thus supporting Bernstein's hypothesis.

The second study (see Chapter 3) compared the success with which middle class and lower class kindergarten children were able to apply four conceptual rules (affirmation, negation, conjunction, disjunction) when the directions were given in four different statement formats: declarative, interrogative, and imperative sentences, as well as key-word phrases.

Each of the 60 subjects was given four test sessions on successive days, with a total of 160 items. For each item, the subjects heard a rule and were required to select from two or three alternatives the picture which matched that rule. The data showed that middle class kindergartners did much better when the instructions were expressed as interrogative or declarative sentences, while the lower class children did relatively better with the key word phrases. Using a Latin Squares repeated measures design, the interaction of socioeconomic class and sentence format was significant at the .05 level. The finding suggests that, compared with middle class youngsters, lower class children are less apt to profit from complete sentences and may even do better with sentence fragments, perhaps because their prior language experience has not involved a rich, well-developed sentence structure.

Chapter 4 presents the third investigation, in which the effect of instructing kindergarten children to speak out loud appropriate and inappropriate words during a selective learning task was explored. The study was carried out with 42 five-year-old children from lower socioeconomic class homes. For each problem, the child was presented with a series of five cards. Each of these cards showed three sizes of the same object, with the location of the different-sized pictures randomly arranged on the successive cards. For each card, the child was required to point to the right sized picture, and was given knowledge of results when he did so. Children had to find the right picture before proceeding to the next card.

All children were given preliminary training in supplying the appropriate label, big, medium or little, with a set of pretest pictures. They were then assigned at random to an attribute labeling group, a non-labeling group, and an object labeling group. Children in the attribute labeling group were taught to label the size of the picture which they selected each time; children in the object labeling group named the object, a word which, while appropriate to the picture, did not help the child solve the problem. The non-labeling group simply pointed to the correct picture. The children who provided the appropriate attribute labels obtained higher scores during training than either of the other two groups. On a posttest involving the same dimensions but with no instructions to verbalize, children who had received attribute training performed significantly higher than those who had vocalized the object labels. These data were interpreted as indicating that vocalizing object labels could product interference, a finding reported earlier by Tracy Kendler.

The fourth study is an attempt to assess the major hypothesis through the use of informal classroom materials. A replication of an earlier experiment was carried out to compare oral and non-oral methods of teaching beginning reading. Over a two-week period, 92 kindergarten children were taught to read 20 individual words, as well as those same words in short phrases and sentences. The contexts in which the skill was demonstrated included matching a cue word at the top of the page to one of three words at the bottom, finding a printed word from an oral cue with no written cue, matching a picture to the proper word in a sequence of printed words, and completing missing word sentences by indicating which one of three words would best complete the sentence. While all subjects were required to make a choice on each item, only the children in the oral group were instructed to say the correct word aloud.

The value of the oral response under informal instructional conditions was demonstrated on the posttest, where the oral group was superior to the non-oral group even though no instructions to vocalize were given and the task consisted entirely of silent reading. This replicated experiment is reported in Chapter 5.

In studies of concept learning, subjects are generally required to discover the concept-defining rule. In schools, however, children are usually given the rule which defines the concept and are then expected to use this information in identifying positive and negative instances of the concept.

The purpose of the investigation, reported in Chapter 6, was to determine whether children who are required to speak certain key words aloud are helped in learning conceptual rules so as to be able to apply them to new instances.

In the first stage of this study, 12 children were randomly assigned to an oral group and a control. Subsequently, eight more children were given a non-oral treatment. All 20 children were enrolled in a Children's Center and were between 58-62 months of age. The instructional program consisted of eight daily lessons approximately 8-12 minutes each.

For each deductive problem in the instruction and the criterion tests, five items involving the same rule were used. The child was told a story in which a missing object or person had to be found. The clue was given in the form of a description (i.e., defining rule) which the child then used as a basis for selecting one of three pictures which might be the missing object (the positive exemplar). The problems involved four of the most important types of conceptual rules (drawn from Bourne's list of 10): Negation, conjunction, disjunction, and joint denial. An example of the latter would be: "Jimmy's sweater has no buttons and no sleeves."

The pre- and posttests of rule application presented eight problems, each with five items, for the four types of rules. In addition, an "inductive" test required the children to identify positive instances in a concept-identification problem without being told the rule.

In the first stage, the oral group was significantly superior to the control ($p < .05$). They were also dramatically superior with the "inductive" problems, which required the use of new conceptual rules. No reliable differences to support the value of oral rehearsal was obtained. However, like the oral group, the non-oral group was superior on the inductive test. Such evidence of transfer suggests the value of this type of training with young children.

The final experiment, presented in Chapter 7, was designed to determine whether disadvantaged children learn to use sentential connectives and quantifiers more effectively when they speak aloud the key words in problem solving tasks. A related question was whether they could learn to withhold judgment when they had not been given sufficient information.

Two methods of instruction were tested, using 120 lower class kindergarten children. After pretesting, the subjects were blocked on two levels of mental age, and randomly assigned to one of three treatments: (1) a non-oral group listened to taped commentary and responded by selecting the appropriate one of three pictures; (2) an oral group listened to the same commentary but was required to speak aloud the relevant verbal cues before selecting the picture; and (3) an uninstructed control. Over an 11 week period, groups of five or six children were given daily programmed lessons, each lasting approximately 12 minutes. Booklets with special feedback ink and, occasionally, demonstrations and games requiring manipulanda, were used.

Phase 1 of the program taught children to say "Can't tell" in situations where there was insufficient information to warrant a "Yes" or "No" response. Phase 2 was a sequence of lessons about the octopus; and Phase 3 involved the application of conceptual rules using sentential connectives: not, and, and or. Pre- and posttests were individually administered to all children.

The results indicated that the instructed groups were reliably superior ($p < .001$) to the controls in the use of quantifiers and connectives. However, teaching children not to guess (i.e., to say, "Can't tell" when given insufficient information) was a difficult task, under either treatment condition. Finally, it was demonstrated that the oral group was reliably superior to the non-oral in learning the nature study concepts.

No differences were found between the two instructed groups when no clear cueing function was provided by the words spoken aloud. On the general listening tests, the non-oral group was superior to the oral group, providing some evidence that requiring children to speak aloud can cause interference when the test situation is quite different from the training.

Conclusions

The findings from the various studies lead to a number of conclusions discussed in Chapter 8. With respect to the value of the oral response during instruction, the general implication is that where there is a specific and direct association to be made, the speaking response has considerable value even though the criterion test involves no speaking whatsoever. This finding was supported in the reading study, where children who spoke the words aloud were better on a silent reading test which involved these same words than children who selected answers without speaking.

The effect of the oral response was much less clear when the material was more complex. Where the critical words constituted only a part of the important information to be assimilated (e.g., function words and, or, not) the oral response, which was generally superior to the non-oral, produced significant differences in only one comparison. It would appear that having pupils simply speak these sentences aloud is inadequate where the thought process is more complex. When greater understanding of the process involved is obtained, it may be possible to identify more accurately the critical ways instruction should be presented within a speaking framework.

There was some evidence that speaking aloud in a mechanical cueing fashion may lead to interference when the child attempts to use this technique in new situations for which verbalization is not appropriate. For example, the child may be extremely familiar with material presented, or on the contrary, rehearses words or phrases which are not helpful and may produce interference. Practice with a wide variety of materials is an essential feature of the curriculum to reduce such negative transfer through increased discrimination and overlearning.

An important contribution of the project to education was the development and evaluation of a number of replicable instructional programs, accompanied by criterion test items. These products are currently being revised for use on a longer range project. Such explorations of new curricular content for this age group demonstrate the potential value of teaching young children to withhold judgment where information is lacking and to become aware of the concept of possibility; where the information given is inadequate, there is a possibility that either true or false may be correct and hence the appropriate response is "Can't tell." The studies suggest that before a child develops a dichotomous way of thinking it may be helpful to teach him to deal with ambiguity and to recognize that frequently no definitive answer is possible.

The studies also indicate that children can listen with understanding and respond appropriately to statements involving function words such as quantifiers, negation, and sentential connectives. In the schools children generally learn concepts deductively from rules given to them rather than through inductive discovery; it may be most desirable for many children, especially those with language deficiencies, to receive systematic practice in listening with comprehension to such rules.

Chapter 1

INTRODUCTION

The main focus of this project has been the improvement of the understanding of spoken language by lower class kindergarten children. This population was selected because recent research has indicated that there are important deficits in the performance on standard English tests with this group, compared to children from middle class homes. However, listening skills are basic to the comprehension of spoken language, which constitutes a prerequisite to adequate school performance regardless of socioeconomic level.

The first concern of the study was to identify areas where young children might be deficient in listening skills; a second focus was on the preparation and evaluation of instructional programs for the improvement of these skills; and the third area of concern was with testing under classroom conditions a hypothesis, for which there is considerable laboratory support, regarding the value of having children speak aloud in developing these competencies.

Following the guidelines of Basil Bernstein, who has pioneered in this area, the "little" but important function words have been the focus of the "listening" instruction. Thus the major emphasis has been on teaching children to listen with comprehension to oral communications which involve negation (no, not), verbal quantifiers (all, some, none), or sentential connectives (and, or). To supply additional areas for the testing of the oral response hypothesis, specific types of content, (a nature study unit and a beginning reading program) were used in the course of the investigation.

One of the important outcomes was the creation of interesting materials (such as picture books with taped commentary, manipulanda, and simple games) in the form of replicable instructional sequences. Equally important was the development of a series of tests for assessing the effectiveness of the programs. In line with the original proposal, these have subsequently been adapted for use in a parallel five-year language study with disadvantaged children, sponsored by the United States Office of Education (Project No. OE 5-85-045). Thus the products of this investigation are already proving their usefulness in practical application.

The value of having young children produce key words aloud is part of a broader question related to overt responding in general. Within the framework of programmed instruction a good deal of research has been carried out to test the hypothesis that overt responding improves learning more than "passive" viewing. Hovland, Lumsdaine, and Sheffield (1949) in an early study found that the overt vocal response aided soldiers in learning the military phonetic alphabet in comparison with passive viewing. The facilitation was greater for less intelligent, less motivated subjects, as well as when the material was more difficult.

Working with 9th and 10th grade boys Gagné and Smith (1962) found that requiring subjects to verbalize during training resulted in superior performance throughout training and on the posttest, although individuals who verbalized took more time. The authors conclude that "requiring S's to verbalize during practice has the effect of making them think of new reasons for their moves, and thus facilitates both the discovery of general principles and their employment in solving successive problems."

Most research, however, fails to support the notion that overt responding produces more effective learning than simply watching and listening. In a typical study (Goldbeck and Campbell, 1962), junior high school students were given the same programmed unit, with one group writing the responses and the other group "thinking" them. Not only did the "active" responders fail to show a reliable superiority to the "passive" group, they took far more time to complete the program. Holland (1966) points out that such studies are generally of short duration and do not allow the covert responders to extinguish their behavior. Furthermore, he indicates that the response required must be relevant to the task, which is not always the case.

Such investigations have often failed to consider that the value of overt responding may be much greater with younger children. Thus Keislar and McNeil (1962) found that first grade children who were required to make a multiple choice selection were not superior to children who were exposed to the same program with the correct answers identified. The real problem, however, hinges on the value of having young subjects speak aloud rather than merely select appropriate choices. In a subsequent study in the field of reading, McNeil and Keislar (1963) demonstrated the value of oral responding even when the criterion task was that of selecting a correct answer from among several alternatives.

The place of overt speaking in learning has received a good deal of attention by psychologists studying the learning processes of young children. White (1965) has proposed that between the ages of five and seven a dramatic shift is made in the quality of the learning process on the part of young children. A crucial feature of this change deals with the way in which the child learns to talk to himself and respond to his own language.

Luria (1961) found that before he is two years of age the child cannot use his own speech to control his behavior. By about three and a half, he can regulate his behavior through his own speech, although he is unable to use this verbalization to inhibit his actions. The child becomes fully able to control his behavior by his own speech at about five, when this control transfers from the child's overt vocalizations to a covert level of speech. Since the young child's tendency to verbalize spontaneously is weak, instructing him to respond verbally in a learning situation will often improve his performance. The older child has learned to supply his own verbal mediators.

Basing his hypothesis on mediation theory, Reese (1962) suggests that children who have not yet learned to respond to their own speech cues are "mediationally deficient" and hence fail to demonstrate the sophisticated learning of older children. This point of view posits two alternative situations: cueing behavior may be so automatic that once children acquire a verbal response it will serve this function without further training. On the other hand, children may demonstrate this mediational function of language only after appropriate learning experiences.

A good deal of research has demonstrated the value of teaching young children to apply a common label to a class of stimulus objects where subsequently the same response is to be learned to each member of this stimulus class. Birge (1941), Cantor (1955) and Norcross and Spiker (1957) have carried out three of the classic studies in this field. Such examples of verbally-mediated generalization have been found with young children best if the subjects are instructed to say the labels aloud. (Cf. Weir and Stevenson, 1959.)

There is considerable evidence to support the notion that requiring young children to speak aloud can foster the use of verbal cueing. Kendler (1964) found, on a reversal shift problem, that kindergarten children who were required to speak aloud demonstrated superior performance in comparison with children who were not asked to speak the appropriate labels. Kendler, Kendler, and Carrick (1966) found that vocal labeling, where relevant, aided kindergarten children in solving inferential problems. Silverman (1966) found that relevant verbalization greatly facilitated learning on a reversal shift task with both three and four-year-old children, as well as seven and eight-year-old children. In his study Silverman required the children to continue the verbal responses during the criterion test.

It is also quite possible that verbalization may serve as interference. Kendler, Kendler, and Carrick (1966) found that while having subjects say the labels aloud helped kindergarten children, this procedure had a detrimental effect at the third grade level. Rosenbaum (1967) had elementary school children explore a multiple choice maze. In one condition performers in the presence of observers called out numbers associated with the correct responses. In a second condition, the observers called out the numbers. In a third condition, no verbalization occurred. On a subsequent retention test observers were superior to performers, older children retained more than younger, and those who did not verbalize but heard another child call out the numbers, did better than subjects in other conditions. Rosenbaum concluded that his study "may be regarded as adding to the list of potentially interfering but frequently required responses, the necessity for active verbalization of the correct response."

Flavell, Beach, and Chinsky (1966) have drawn the distinction between a production deficiency and a mediation deficiency. Working with six and seven-year-old children, Keeney, Cannizzo, and Flavell (1967) identified children who rehearsed spontaneously during a recall task and those who did not rehearse. Although the non-rehearsers, when instructed to whisper the object names to be remembered, did as well as the spontaneous rehearsers, they failed to continue to rehearse when the requirement was lifted. These authors concluded that the major problem in teaching children to use their own language as cues does not lie in a mediational deficiency, but in a production deficiency. If children produce their own mediators they seem to have little problem in making use of them. Gratch (1966) also found that middle class children were not less deficient, as measured by spontaneous production, than lower class children.

McNeany and Keislar (1966), presented 60 four-year-old children with a selective learning task involving size. The children who were given overt training with a consistent set of labels performed better during training and on a posttest than children who saw the same stimuli but were given no labeling training. This facilitation of verbal labeling training cannot be attributed simply to the fact that these subjects were given a new label to use, since the differences between treatment groups were larger on the problems where the correct answer involved very familiar labels. When the instructional program was expanded to involve pictures of different but related dimensions, no differences were found between the labeling and non-labeling groups. This may have been due to interfering effects between the four sets of labels; children in the labeling group may have been confused as to which label they were required to use for a given stimulus.

In this project, the major question was concerned with the value of the spoken response as an instructional procedure. That is, in order to teach a child to understand spoken language, is it important during instruction to require him to say these words out loud? The effects of speaking aloud were assessed under a variety of conditions, ranging from tightly controlled tasks where a single word was all that was required, to situations where complex curricular materials were involved and the key words were always embedded in a sentence context.

To test the major hypothesis an oral and a non-oral treatment were established. The subjects in both these groups responded throughout instruction by answering multiple choice type questions, where a knowledge of results was consistently given. Just like the oral group, the non-oral group was required to pay attention to the relevant features of the problems posed and reinforced for doing so. Consequently, the difference between the treatments was not in terms of "active" versus "passive" but lay entirely in the fact that the oral group, in addition to the multiple choice response, was required to speak aloud the key words or sentence.

The Problem

The merits of overt verbalization may be greater if the response being vocalized is not part of the child's repertoire. Speaking aloud may be less important for those children who have already mastered the words, either singly or in patterns, to be spoken. It is likely, therefore, that the effect of overt verbalization would be greater in those cases where the response was unfamiliar and had to be practiced in order to become part of the individual's repertoire. For young children, therefore, instructions to verbalize overtly seem to be effective in part because children all too frequently do not verbalize or rehearse what they are learning. Constant vocalization may well make it more likely that active rehearsing techniques will be adopted by the child. On the other hand, there is the risk that these covert behaviors may serve to interfere with other types of learning.

Organization of Report

The project has taken the form of a series of related and yet independent studies dealing with (1) identification of language problems in the attainment of listening skills, (2) construction of instruments to test achievement in such areas, (3) development of programs to cultivate higher levels of listening comprehension skills, and (4) testing of hypotheses regarding the value of oral responding in instructional programs.

Six studies are reported, each one presented as a separate chapter. The series of studies begins with the descriptive investigation of Chapter 2 and culminates in a three-month experiment reported as the final study in Chapter 7. Each of these six studies has either been published or has been reported as a paper on the program of the annual meeting of the American Educational Research Association of 1968 or 1969.

In the first investigation, reported in Chapper 2, "Young Children's Immediate Memory of Word Classes in Relation to Social Class," young children from lower class homes were compared with middle class children, to test the hypothesis that lower class children show a greater relative deficiency in their understanding of "function" words. These words, basic as they are to listening comprehension, constitute the instructional goals in the subsequent chapters. A new instrument, analogous to a digit-span test, was developed and used for this study.

The study reported in Chapter 3, "The Effect of Different Verbal Directions upon the Application of Concept Defining Rules by Middle and Lower Class Kindergarten Children," compares the abilities of lower class children with those of middle class children with respect to listening and applying rules under various kinds of sentence formats. Class differences in responding to negation and sentential connectives under different modes of presentation of the tasks were explored.

In Chapter 4, "Kindergarten Children's Use of Vocal Labeling Responses in Problem Solving," the possible role of interference in vocalizing was assessed under three treatment conditions. Two oral groups were instructed to vocalize labels aloud, while a third group was not required to label. The labels used by the first oral group were those which referred to the critical attributes, whereas the second oral group spoke the names of the objects which, while appropriate labels, did not serve as functional cues for the task. This design made it possible to test the effects of facilitation and interference under the two labeling conditions, in comparison with the non-labeling group.

Chapter 5 presents a replication of an earlier investigation (McNeil and Keislar, 1963) in which the oral response proved to be dramatically effective in beginning reading. For the present study instructional materials, which could be easily adapted for regular classroom use, were developed, whereas the earlier experiment required expensive teaching machine equipment. In addition to testing the hypothesis relative to the value of oral responding in this exceedingly important subject area, the experiment was designed to determine whether informal and flexible procedures, using what might be "teacher-made" materials, could provide an acceptable level of precison.

The study reported in Chapter 6, "Training in Listening to and Applying Concept-defining Rules," compared oral and non-oral methods of teaching kindergarten children to listen to and use function words embedded in spoken sentences. The child was expected to respond to the use of negation and sentential connectives such as and and or by following instructions. The need for teaching children to apply simple conceptual rules to a series of instances is predicated on the fact that most school concepts are learned in this deductive fashion; laboratory experiments on concept learning almost invariably utilize inductive processes.

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The final experiment of the project reported in Chapter 7, was carried out with a large group of subjects over almost a three-month period. The major hypothesis regarding the value of the oral response was tested by using two experimental groups as well as a control. A diversity of materials were incorporated into a series of units designed to assess the cumulative effect of vocalization in a curricular context.

The subjects were taught not only to respond to negation and sentential connectives, as in Chapter 6, but they were required to interpret sentences involving the verbal quantifiers, _all_, _some_, and _none_, as well as _always_, _sometimes_, and _never_. An important feature of this program was that these young children were taught not only to answer questions with "Yes" or "No," but also to withhold judgment (i.e., to say "Can't tell") when insufficient information was available.

Chapter 8, is a discussion based on the results from all the studies, drawn together and interpreted in terms of contributions to theory and practice in education. The conclusions are of two major types, one dealing primarily with the value of overt verbalization during listening instruction, and the second referring to the desirability of introducing new types of instructional goals having to do with the development of listening skills in the kindergarten curriculum.

Following the references, the various Appendixes present only a small portion of the voluminous amount of materials prepared and used during the course of the several investigations. These include copies of the criterion tests as well as sample lessons which illustrate how the instruction was carried on and the differences between experimental treatments.

Chapter 2

YOUNG CHILDREN'S IMMEDIATE MEMORY OF WORD CLASSES IN RELATION TO SOCIAL CLASS[1]

Of all the recent literature relating to social class differences in language, perhaps no single theoretical formulation has stirred more interest than that of Basil Bernstein (1960, 1961). Although many researchers have suggested that there is a functional difference between the lower and middle class cultures in "standard" language usage (e.g. Deutsch, 1964; Thomas, Schutz and Keislar, 1968), Bernstein proposes an explanation for the apparent disparity. Essentially, he suggests that the lower class culture follows a "restricted" linguistic code which hinders the development of vocabulary and keeps thought at a low level of conceptualization. Bernstein proposes that if the lower class children were helped to acquire the "elaborative" linguistic code of the middle class, the measured intellect and academic "differences" between the groups would largely disappear.

To encourage research related to the theory, Bernstein has enumerated various hypotheses capable of investigation. For example, it is alleged that one important distinction is the relative inferiority of the lower class in the use of function words (i.e., conjunctions that complete sentences, negation, etc.). More specifically, Bernstein (1959) states:

> Because of a simple sentence construction, and the fact that a public ('restricted') language does not permit the use of conjunctions which serve as important logical distributors of meaning and sequence, a public language will be one in which logical modification and stress can only be crudely rendered linguistically. This necessarily affects the length and type of the completed thought. Of equal importance, the reliance on a small group of conjunctions...often means that a wrong conjunction is used or an approximate term is constantly substituted for a more exact logical distinction.

If Bernstein's hypothesis is correct (i.e., that the lower class child is particularly deficient with function words due to environmental deprivation), then presumably young lower class children have the same deficiency with function words as do middle class children who are somewhat younger. A number of research strategies are available to determine if this is indeed the case. One approach would be that most often employed by the descriptive linguists: simply study the child's everyday speech and record the function words as they occur. For example, using this technique Brown and Berko (1960) observed that children showed an increasing ability with age to construct grammatically correct sentences using new words. The lack of experimental control inherent in this strategy presents grave although not insurmountable problems. However, another approach (and the one used in this study) has been employed by Brown and Fraser (1961) in which a measure is obtained of the child's ability to echo or repeat sentences which he hears. The use of this echoic technique provides for a standardized exposure to sentence structures as desired.

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[1] A version of this chapter was presented as a paper entitled, "Immediate Memory of Three Word Classes as a Function of Social Class and Grade", by Samuel R. Schutz and Evan R. Keislar, at the annual meeting of the American Educational Research Association, Chicago, February 1968.

Employing the latter strategy, Brown and Fraser (1961) found that the number of word responses included in each separate sentence increased as the children grew older; in addition, they noticed that the speech of the younger children was systematically abbreviated. The latter finding led the authors to describe the speech of the children as "telegraphic English" and to attribute the increased ability to employ function words to an increase in "memory span." The investigators assumed, of course, that there is a high relationship between ease of repeating a given sentence and the subject's familiarity with the words in the sentence. One serious limitation of the Brown and Fraser study was the confounding of the word (morpheme) recall with the varying syntax of the respective sentences; that is, if an error were made, it could not be determined whether this was due to the nature of the morphemes (word-class) or the nature of the syntactic construction, or both.

In the present investigation, attention was focused solely on the child's ability to echo words belonging to a certain word class; that is, the words were presented alone, without sentential constraint. In this way, syntax was eliminated as a confounding variable and any reliable differences could be attributed with confidence to the word classes. More specifically, the study reported here is a controlled comparison of lower and middle class children in ability to immediately recall function words, using two other word classes (nouns and verbs) as a control. In order to sample children of different ages, the test was administered at three successive grade levels (kindergarten, first, and second grade). It was, of course, expected that there would be differences between the two social classes and among the grades and word classes. The concern of the study, however, was with the interaction of SES with the other two variables. Consequently, the hypotheses are:

Hypothesis 1: Deficiency in word recall of the lower class child is greater for function words than for either nouns or verbs in relation to the middle class child.

Hypothesis 2: The difference between the social classes for recall of function words relative to recall of either nouns or verbs is larger for children in the older grades than for children in the younger grades.

Method

Children from two different schools, one middle and one lower class, were tested at the three grade levels. Social class was defined by the Los Angeles School district in terms of the communities in which the schools were located. The lower class was entirely Negro and had been earmarked as eligible for special poverty funds under ESEA; the middle class was entirely

Caucasian. In both schools, the Principal assigned one intact class for each of the grades. And, from these classes, 60 Ss were randomly selected for testing, 30 from each school and 10 from each grade.

In preparing the test instrument, a sample of seven one-syllable words for each word class was selected from the 500 most frequent words in the original Thorndike count (Thorndike and Lorge, 1944), resulting in seven nouns, seven verbs, and seven function words. After obtaining this sample of words, the test was structured; it was essentially a word analog to the "digit span" memory task. The test is fully reproduced in Table 1. It will be seen that the entire test contained six series, and each of the word classes was represented in every series such that there were two words per word class in series 1, three words per word class in series 2, continuing to seven words per word class in series 6. Care was taken that no list contained common homonyms or minimal pairs.

The test was administered individually, and the order in which the items were presented is given in Table 1. E read each item at the rate of one word per second and S responded before going to the next item. E read each item only once, and testing was discontinued for each word class when an error was made in that class. An error was defined as any omission, addition, or incorrect order. Note that once a person made an error for any word class, he was not given any longer lists within that word class to recall. Ss' score for any word class was the longest list of words he could repeat without making an error.

Results and Discussion

The data were analysed using a 3 x 3 x 2 factorial design with one repeated factor (Winer, 1962). The results of this study are presented in Tables 2 & 3. The results relative to Hypothesis 1 are graphed in Figure 1. It may be seen that the highly significant interaction between social class and word class ($p < .01$) is due to the relative inadequacy of the lower class with the function words. Hypothesis 1 is therefore supported.

The results for each grade relative to Hypothesis 2 are separately graphed in Figure 2. The gap between the social classes on the function words is fairly consistent from one grade to the next. Nevertheless, the triple interaction (SES x word class x grade) falls short of significance and hence Hypothesis 2 is not supported.

As was expected, the differences relative to each of the main effects (SES, word class, grade) were significant. Table 3 also shows a significant interaction between social class and grade; the differences between the classes are much greater in kindergarten than in the first and second grades. Since the overall differences between the first and second grades were so slight, it is possible that this tapering off may be due to a ceiling effect.

The results of this study give considerable support to one aspect of Basil Bernstein's theory of social class differences in language development, i.e., that the verbal deficiency of lower class children is largest in function words. In addition, the findings of the present study suggest the utility of such an immediate memory instrument for other studies of language assessment.

TABLE 1

A Test of Immediate Memory for Three Word Classes

Series 1: Two words per word class.

Item 1:	and	of
Item 2:	boy	chair
Item 3:	run	swim

Series 2: Three words per word class.

Item 4:	cup	chair	boy
Item 5:	of	or	and
Item 6:	swim	hit	run

Series 3: Four words per word class.

Item 7:	fish	boy	chair	cup
Item 8:	run	build	hit	swim
Item 9:	and	if	or	of

Series 4: Five words per word class.

Item 10:	hit	run	swim	grow	build
Item 11:	chair	fish	cup	hat	boy
Item 12:	or	and	of	down	if

Series 5: Six words per word class.

Item 13:	but	and	down	if	or	or
Item 14:	hat	chair	fish	boy	cup	leg
Item 15:	drive	run	grow	build	swim	hit

Series 6: Seven words per word class.

Item 16:	tree	chair	boy	leg	hat	fish	cup
Item 17:	if	down	but	or	of	and	on
Item 18:	build	grow	drive	hit	swim	run	shoot

TABLE 2

Means and Standard Deviations on Immediate Memory Test
by Word Class, Grade, and Socioeconomic Level

Socioeconomic Level		WORD CLASS					
		Function Words		Nouns		Verbs	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Low	Grade K	3.1	.88	3.6	.70	3.4	.84
	Grade 1	3.7	.48	4.5	.53	4.4	.70
	Grade 2	3.7	.95	4.9	.92	4.2	1.20
High	Grade K	3.9	.57	3.9	.57	3.9	.57
	Grade 1	4.3	.67	4.9	1.29	4.7	.68
	Grade 2	5.1	.88	5.0	1.25	4.0	.47

TABLE 3

Summary of Analysis of Variance
for Scores on Test of Immediate Memory

Source of Variation	SS	df	MS	F
Between Subjects	106.98	59	1.81	1.39
Social Class (A)	9.80	1	9.80	7.54**
Grade (B)	26.87	2	13.44	10.34**
A X B	.04	2	.02	---
Error Between	70.27	54	1.30	---
Within Subjects	61.33	120	.51	1.38
Word Class (C)	8.04	2	4.02	10.84**
A X C	4.94	2	2.47	6.68**
B X C	5.40	4	1.35	3.65**
A X B X C	3.22	4	.81	2.19
Error Within	39.73	108	.37	---

**Significant at the .01 level of confidence.

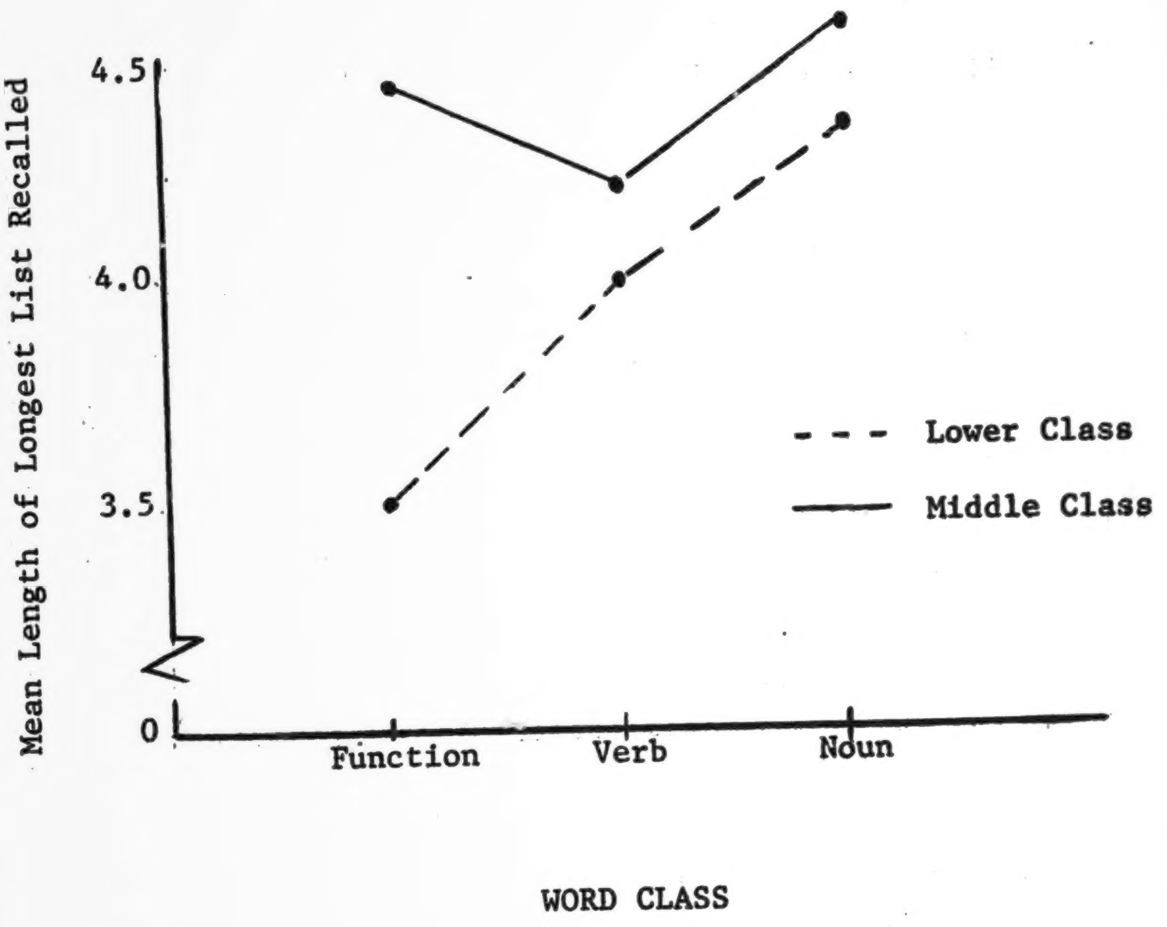
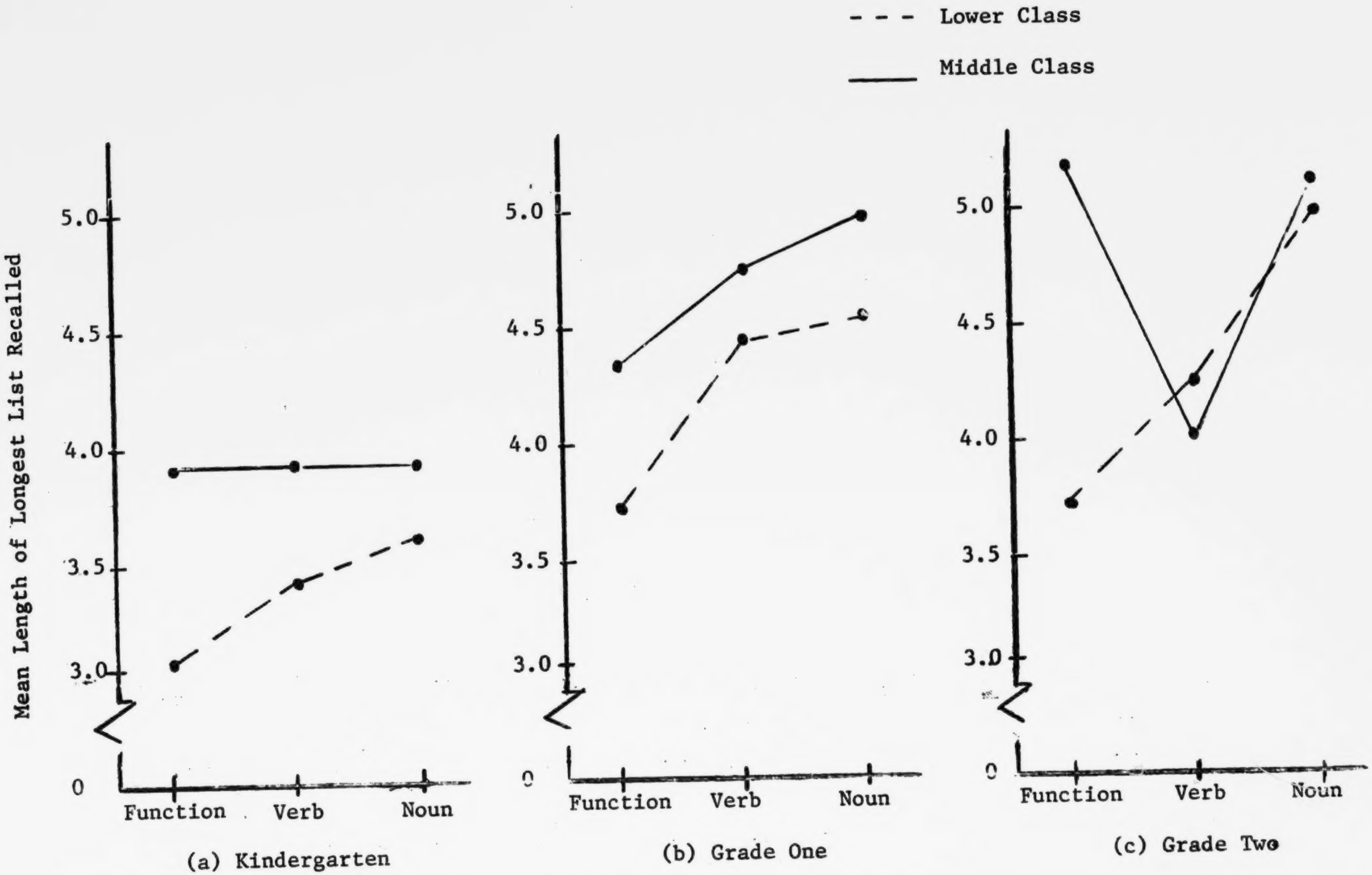


Figure 1. Mean Score by Word Class for Each Social Class



(a) Kindergarten (b) Grade One (c) Grade Two

Figure 2. Mean Length of Longest List Recalled within Each Word Class for Lower and Middle Class Kindergarten, First, and Second Grade Children

Chapter 3

THE EFFECT OF DIFFERENT VERBAL DIRECTIONS UPON THE APPLICATION OF CONCEPT DEFINING RULES BY MIDDLE AND LOWER CLASS KINDERGARTEN CHILDREN[1]

The purpose of the investigation was to assess the abilities of kindergarten children to apply five different kinds of concept defining rules when verbal directions were given in four different sentence formats. The concept defining rules which were used by the children as a basis for selecting positive instances included affirmation, negation, conjunction, disjunction and joint denial. The four sentence formats in which the directions were given included interrogative, imperative and declarative sentences, as well as incomplete sentences consisting of key word phrases.

Review of Related Research

Comparisons of the verbal and conceptual abilities of middle and lower class children have been of considerable interest to researchers in recent years. Generally, the data have indicated that middle class children score well above lower class children on a number of standard individual and group measures of intelligence (Deutsch, 1968). It has also been noted that tasks requiring verbal comprehension and the ability to deal with abstract concepts are the ones which account in large part for the finding of such differences between classes (Carson and Rabin, 1960). Performance tasks which correlate highly with "general intelligence," such as the Goodenough Draw-A-Man I.Q. test, have not yielded significant differences between the groups (Anastasi and D'Angelo, 1952).

Although the exact nature of the verbal skills which underlie test taking ability is not yet clearly understood, a number of hypotheses have been offered to account for the social class differences. Prominent among these is the theory of social class and linguistic development offered by Basil Bernstein (1961). According to Bernstein, language structures and conditions what and how a child learns, and thus how he performs on tests of intellectual functioning. He identifies two forms of communication codes or styles of verbal behavior: restricted and elaborated.

Restricted codes are described as: "stereotyped, limited, and condensed, lacking in specificity and the exactness needed for precise conceptualization and differentiation. Sentences are short, simple, often unfinished; there is little use of subordinate clauses for elaborating the content of the sentence; it is a language of implicit meaning. The basic quality of this mode is to limit the range and detail of the concepts and information involved" (Hess and Shipman, 1965).

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[1] A version of this chapter was presented as a paper at the 1968 annual meeting of the American Educational Research Association, by Sally A. Thomas, Samuel R. Schutz, and Evan R. Keislar, entitled: "The effect of different verbal directions upon the interpretation of conceptual rules by middle and lower class kindergarten children."

Elaborated codes, on the other hand, are described as: "those in which communication is individualized and the message is specific to a particular situation, topic and person. It is more particular, more differentiated, and more precise. It permits expression of a wider and more complex range of thought, tending toward discrimination among cognitive and affective content" (Hess and Shipman, 1965).

Restricted codes, according to Bernstein, are typically used by lower class families; whereas the elaborated code is the usual mode of communication for middle and upper class families. The effects of early and consistent experience with these codes may then be seen to result in differential cognitive development and academic achievement and test performance.

Some empirical support for Bernstein's position has been provided by a series of studies carried out at the Urban Child Center of the University of Chicago (Hess and Shipman, 1966). The objective of the research program was to relate the verbal behavior and performance of mothers from four different socioeconomic classes to the cognitive and scholastic behavior of their children. The data, which apppear to confirm Bernstein's hypotheses in regard to the effect of the socialization of differential linguistic codes, were obtained from interviews with the mothers and from the scoring of tests of the children's performances in three structured teaching situations. In summarizing their data, which are not as yet complete, Hess and Shipman have suggested that the effect of the restricted code is to require the lower class child to respond only to commands and thus he is not apt to reflect or to relate his behavior to the context in which it occurred. The result of the socialization of the elaborated code, however, is to require the middle class child to reflect, to consider the consequences of his behavior, to weigh decisions, and to choose among alternatives.

The findings of the Hess and Shipman studies indicate that children from lower socioeconomic class backgrounds enter school with a somewhat different language system than do middle class children. These results are in accord with the findings of a large cross-sectional language study done at the Institute for Developmental Studies at the New York Medical College. According to Dr. Cynthia Deutsch (1966) these differences in language systems are particularly notable in the grammatical structure of the language, and in language used to express relations. In general, the linguistic code of the disadvantaged or lower class child has been found to be "simpler in syntax and less rich in descriptive terms and modifiers" than that of the middle class child; and to be particularly deficient in the use of sentential connectives or function words (i.e. and, not, either, or if).

The language deficiencies of disadvantaged children then, may be seen as consisting in the lack of ability to deal with certain language structures which are necessary for obtaining and transmitting information and for carrying on verbal reasoning. In short, the disadvantaged child fails to master the cognitive uses of language which are the uses that are of primary importance for successful school performance.

The reported findings of differential language patterns between social class groups would seem to be of critical importance in accounting for the consistant differences in performance of the two groups on various tests of intelligence. The relative facility of children in different socioeconomic class groups to understand and respond appropriately to different verbal directions would also seem to be relevant to this question. In most research reports and descriptions of test instruments, however, the directions to the subjects are briefly described or indirectly quoted or presented in the appendixes. Usually the forms of such directions or instructions are considered to constitute a set of background variables rather than independent variables entering into the experimental or testing questions (Gagné 1964). In contradistinction to such factors as the amount of stimulus material presented, the nature of the stimuli (whether figures, sounds, or objects) and the order of presentation of the stimuli, verbal directions tend to constitute a portion of the testing situation which is controlled rather than varied. Most often a standard set of directions, which has not necessarily been carefully pretested for ambiguity or clarity of linguistic content, is given to all subjects in the same way that a standard amount of illumination is used in the testing room or a standard volume for the tape recorder is selected.

It is possible, however, to consider the verbal direction to the subjects as comprising a set of important independent variables worthy of experimental manipulation and investigation. Differential acquisition rates for a number of learning tasks such as problem solving (Maier, 1930), concept learning (Gagné, 1964) and classical eyelid conditioning (Norris and Grant, 1948) have been reported to be a function of the particular verbal directions given. In some cases the use of different directions for the same task resulted in more rapid learning of motor skills (Gagne, 1964). In one study the absence of verbal instructions in a relatively simple concept learning problem resulted in an almost impossible task for those who did not receive verbal instruction. As Gagné (1964) has pointed out, "Instructions do not operate as undifferentiated vocal noises. Instead what is said (or not said) is quite important to the results obtained." The nature of the relationship between the conceptual learning and the verbal directions which are a part of the learning task, is a complex problem for researchers concerned with conceptual behavior in humans (Bourne, 1966).

Differences in the effect of verbal directions, which have been obtained in the previously cited studies, would appear to be related to whether the subject "understands" the directions which are used to describe the task or to call for a particular response. That is, whether or not the child can respond to the directions appropriately depends upon his prior ability to deal with the grammatical constructs and sentential connectives involved in the instructions. Relating the findings of differential language patterns between middle and lower class children to the question of the effect of different verbal directions upon conceptual problem solving behaviors would thus appear to be of considerable research importance.

Problem

The purpose of the present study was to assess the abilities of middle and lower class kindergarten children to respond appropriately to different concept defining rules as a function of the manner in which the directions were phrased. It was proposed that differences in children's abilities to understand and respond appropriately to verbal directions are related to differences in socioeconimic status and are based upon differential language patterns. Whether or not children are capable of responding appropriately to directions in a conceptual problem solving task was hypothesized to depend upon their prior abilities to deal with particular terms involved in the instructions, as well as their abilities to deal with various sentence formats (interrogative, imperative, declarative and incomplete sentences involving key-word phrases).

Subjects

A total of 60 kindergarten children from the greater Los Angeles area served as subjects; 29 from a middle socioeconomic class, predominantly Caucasian school; and 31 from a lower socioeconomic class, predominantly Negro school. The ages of the subjects ranged from 5.0 years to 5.8 years.

Test Instrument

The test instrument was developed after several preliminary tryouts with 64 children. In its final form, it provided a measure on five concept rules (affirmation, negation, conjunction, disjunction and joint denial) when the directions were given in four different sentence formats (key words--incomplete sentences, declarative, interrogative and imperative sentences). There were 100 items in the entire test.

For half of the test, designated as the "Following Instructions" portion, the children were presented with a series of 50 6" x 8" white stimulus cards, each containing two pictures. For each item, the subjects were given a tape recorded direction designating the correct conceptual rule. They were required to point to the picture which matched the rule.

The other half of the test, designated as the "Problem Solving" portion, consisted of a series of ten retention problems (two problems for each conceptual rule). Each problem had five different 6" x 8" stimulus card items, but the tape recorded direction designating the correct concept rule was given only on the first item. The subjects were then required to remember the correct concept defining rule in order to respond appropriately to the four subsequent items on which no directions were given. The subjects were required to point to the picture which matched the rule given on the first item.

To illustrate the way in which the sentence formats were related to the concept defining rules and to the pictorial sitmuli, examples of affirmation and negation problems are presented in Figures 3 and 4. In addition, sample items for conjunction, disjunction and joint denial problems may be found in Appendixes 1 and 2.

Procedure

Following an introduction to the task, a practice session was given to teach all subjects to give an appropriate pointing response for each item. This practice was repeated until each child reached a criterion of 10 errorless trials in pointing to the right picture. The test was administered to each child individually on four successive days. Each daily test session was approximately 15 minutes in length. The order of presentation of concept defining rules and sentence formats was balanced across subjects for both the Following Instructions and the Problem Solving portions of the test.

Results

The performance of subjects on Part I, Following Instructions, of the test was very similar to their performance on Part II, Problem Solving; no reliable differences were found on any comparison for either social class between the two parts. Consequently, in order to simplify the analysis and to provide greater reliability, the scores from corresponding sections of the two parts were combined.

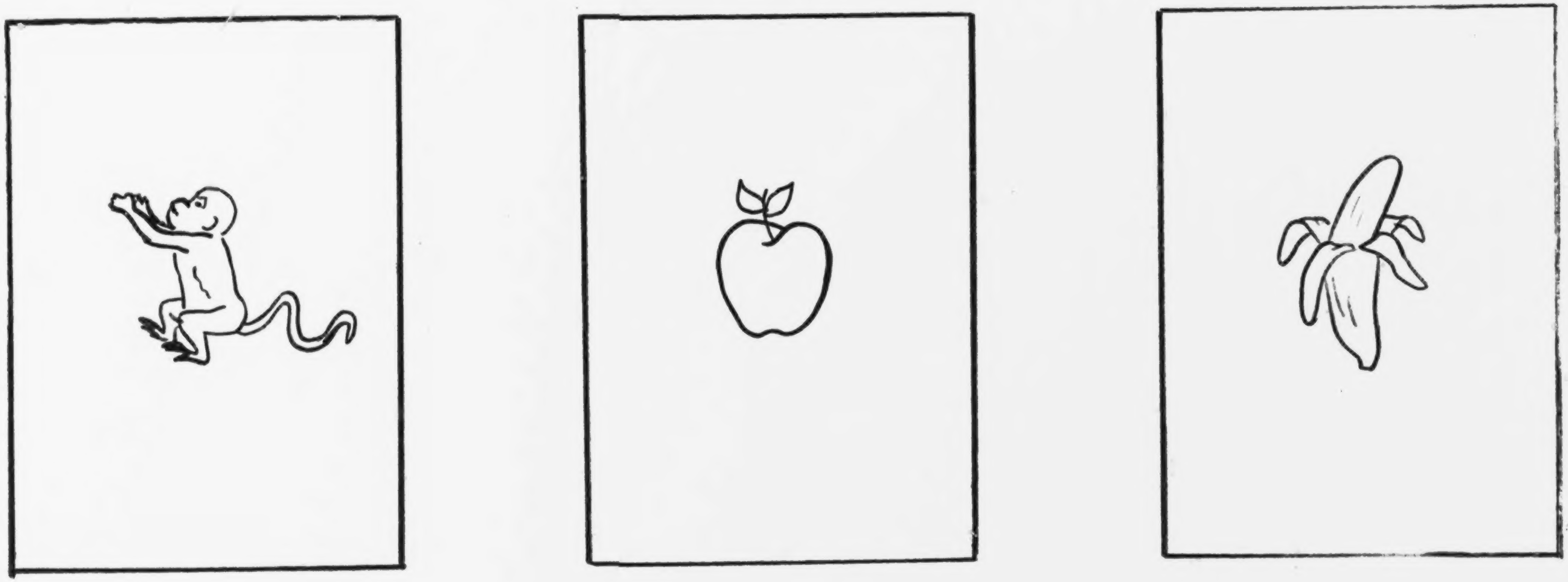
The results of the general test are presented in Table 4. Here are given the mean errors and standard deviations for each sentence format and concept defining rule combination for the two social classes separately. In addition total scores for each rule are given for each social class. From Table 4 it may be noted that the rule of affirmation was quite easy for both social class groups. Disjunction and conjunction were of intermediate difficulty and negation was much more difficult. The problems involving joint denial, however, were so extremely difficult for all subjects that the mean scores for this rule were at a chance level; consequently, in the analysis of the data, scores for this part of the test were excluded.

The data were analyzed using a Latin Squares (repeated measures) design with a correction for unequal N's. The results of the analysis comparing four concept rules, four sentence formats and two socioeconomic classes are given in Table 5 and may be summarized as follows:

1. For the total test, the difference in performance of middle and lower class children was not reliable.

2. Performance on the concept defining rules differed significantly with the affirmation items by far the easiest and the joint denial items the most difficult for all subjects. The ascending order of difficulty for the five concept rules was affirmation, disjunction, conjunction, negation and joint denial.

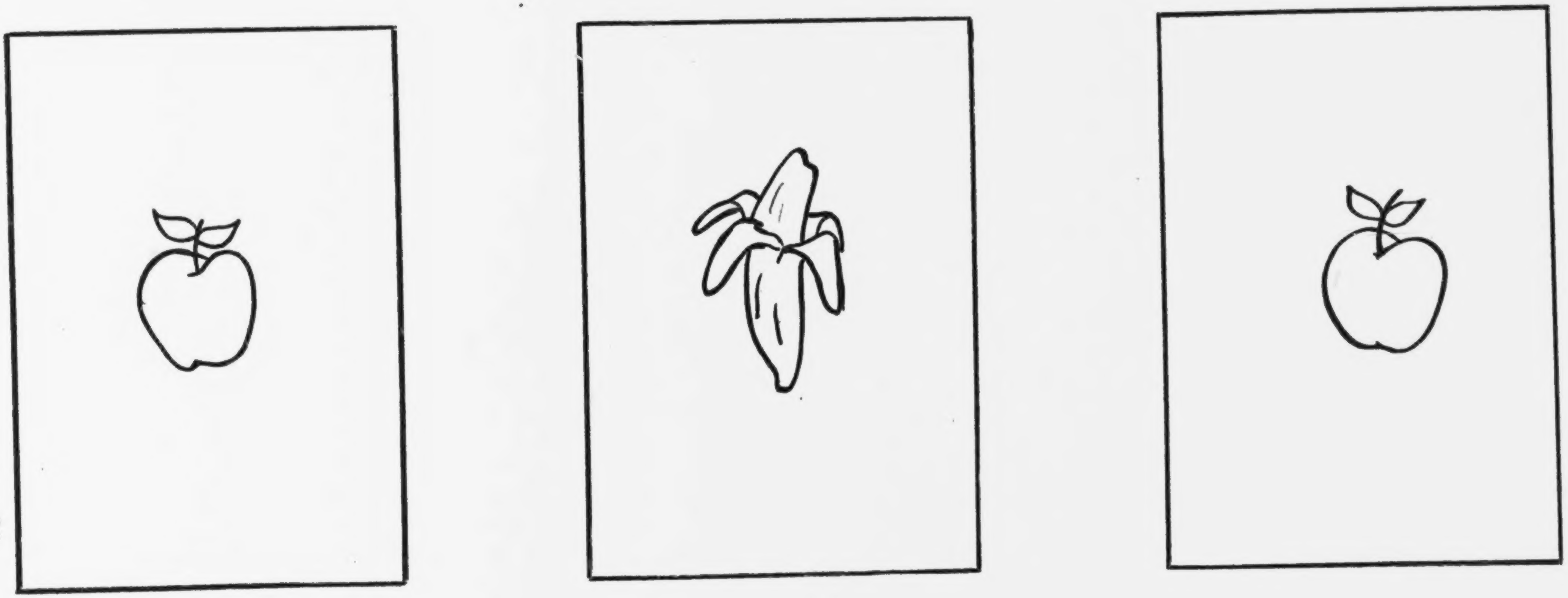
3. There was a significant difference attributable to the sentence format of the directions. Some formats were much easier for the children than others.



Commentary for each sentence format:

Phrase: "Banana"
Imperative: "Find a banana."
Interrogative: "Which box has a banana?"
Declarative: "In the right box there's a banana."

Figure 3. Sample Item for the Rule of Affirmation for Each Sentence Format



Commentary for each sentence format:

Phrase: "No apple"
Imperative: "Find no apple."
Interrogative: "Which box has no apple?"
Declarative: "In the right box there's no apple."

Figure 4. Sample Item for the Rule of Negation for Each Sentence Format

TABLE 4

Mean Errors and Standard Deviations of Test on Concept Rules and Sentence Format by Social Class

Class	Sentence Formats	Concept Defining Rules Affirmation Mean	S.D.	Negation Mean	S.D.	Conjunction Mean	S.D.	Disjunction Mean	S.D.	Joint Denial Mean	S.D.
Lower (N=31)	Phrase	2.9	2.0	19.0	16.6	8.1	6.9	12.4	4.3	32.5	4.0
	Imperative	0.8	1.0	22.5	13.4	8.1	6.2	5.9	4.4	36.0	2.7
	Interrogative	0.9	1.9	18.9	13.6	10.8	3.3	6.6	5.6	36.6	2.9
	Declarative	1.0	1.1	21.4	19.0	13.8	7.3	12.9	4.9	29.3	12.9
	Total	1.4	1.7	20.4	15.0	10.3	6.2	9.6	5.6	33.5	7.4
Middle (N=29)	Phrase	1.0	2.5	27.9	14.1	16.4	4.6	10.9	7.7	37.3	4.9
	Imperative	3.5	3.9	18.1	18.4	11.6	6.0	9.2	3.9	36.4	4.1
	Interrogative	4.0	4.6	4.3	6.2	6.8	6.6	5.9	5.5	32.0	9.8
	Declarative	2.8	4.8	16.6	18.1	11.1	8.6	7.5	11.2	37.1	3.3
	Total	2.7	3.9	16.7	16.5	11.0	7.2	8.3	7.7	36.1	5.5

TABLE 5

Results of the Latin Squares Analysis by
Social Class, Concept Defining Rules, and Sentence Format

Source of Variation	df	MS	F
Between subjects	159		
Socioeconomic Class (C)	1	49.68	< 1
Groups within C	6	120.67	< 1
Subjects within groups	52	129.36	
Within subjects	180		
Rules (A)	3	2753.85	42.27**
Sentence Format (B)	3	215.08	3.30*
A x C	3	74.65	1.14
B x C	3	193.12	2.96*
Residual	12	108.02	1.65
Errot (within)	156	65.14	

---

* $p < .05$
** $p < .01$

4. The interaction between social class and sentence format was significant at the .05 level. These figures in mean errors and standard deviations, for lower and middle class subjects on four sentence formats, have been presented in Table 6 for comparison purposes and are represented in graphic form in Figure 5. As it may be noted from the figure, the differences took the following form.

   (a) Middle class kindergartners did relatively better when the sentence format was interrogative; for example: "Which box has no apple?" The poorest performance for the middle class kindergartners, however, was obtained when the directions were given in the short key word phrase incomplete sentence format as: "no apple."

   (b) Lower class kindergartners on the other hand did relatively better when the directions were given in the short imperative sentence format as: "Find no soldier." The poorest performance for the lower class subjects was obtained when the directions were in the complex declarative format: "In the right box, there's no dog."

5. Since a significant interaction was obtained between social class and sentence format, an analysis of the simple effects was carried out. The analysis revealed that for middle class subjects the sentence format of the directions was significant at the .01 level. The effects of differences in sentence format for the lower class kindergartners were not reliable.

Conclusions

The data obtained from the present investigation support the hypothesis that a comparative analysis of middle and lower class children's verbal and conceptual abilities must take into account the subjects' differential facilities in understanding and interpreting directions. The observation that the ability to follow directions correctly varies according to the specific sentence format used, and that sentence format is particularly important for middle class children is also of interest.

One interpretation of this finding is that perhaps some of the differences which have been obtained between social class groups may be due to selection factors in test constructions which favor by inclusion, the particular language patterns most familiar to middle class children. This interpretation is based upon related research which has indicated that longer, more complex sentences such as were employed in the interrogative and declarative sentence formats of the test, are much closer to the patterns of verbal directions and communication which are typical to the middle class culture (Deutsch, 1966; Bernstein, 1961).

Additional related research has indicated that lower class children, to whom the use of function words is little known, are not aided by their inclusion in full sentences. But for these children, performance is as good or better when the directions are given in key words, incomplete sentences and very simple sentences such as were employed for the key word and imperative sentence formats of this test (Hess and Shipman, 1966).

TABLE 6

Mean Errors and Standard Deviations
for Lower and Middle Class Subjects on Four Sentence Formats

Class	Sentence Formats	Total for Four Conceptual Rules Mean	Total for Four Conceptual Rules S.D.
Lower	Phrase	10.7	10.8
	Imperative	9.4	11.1
	Interrogative	9.6	9.9
	Declarative	12.0	12.0
Middle	Phrase	13.8	13.3
	Imperative	10.8	11.5
	Interrogative	5.3	5.7
	Declarative	8.8	11.2

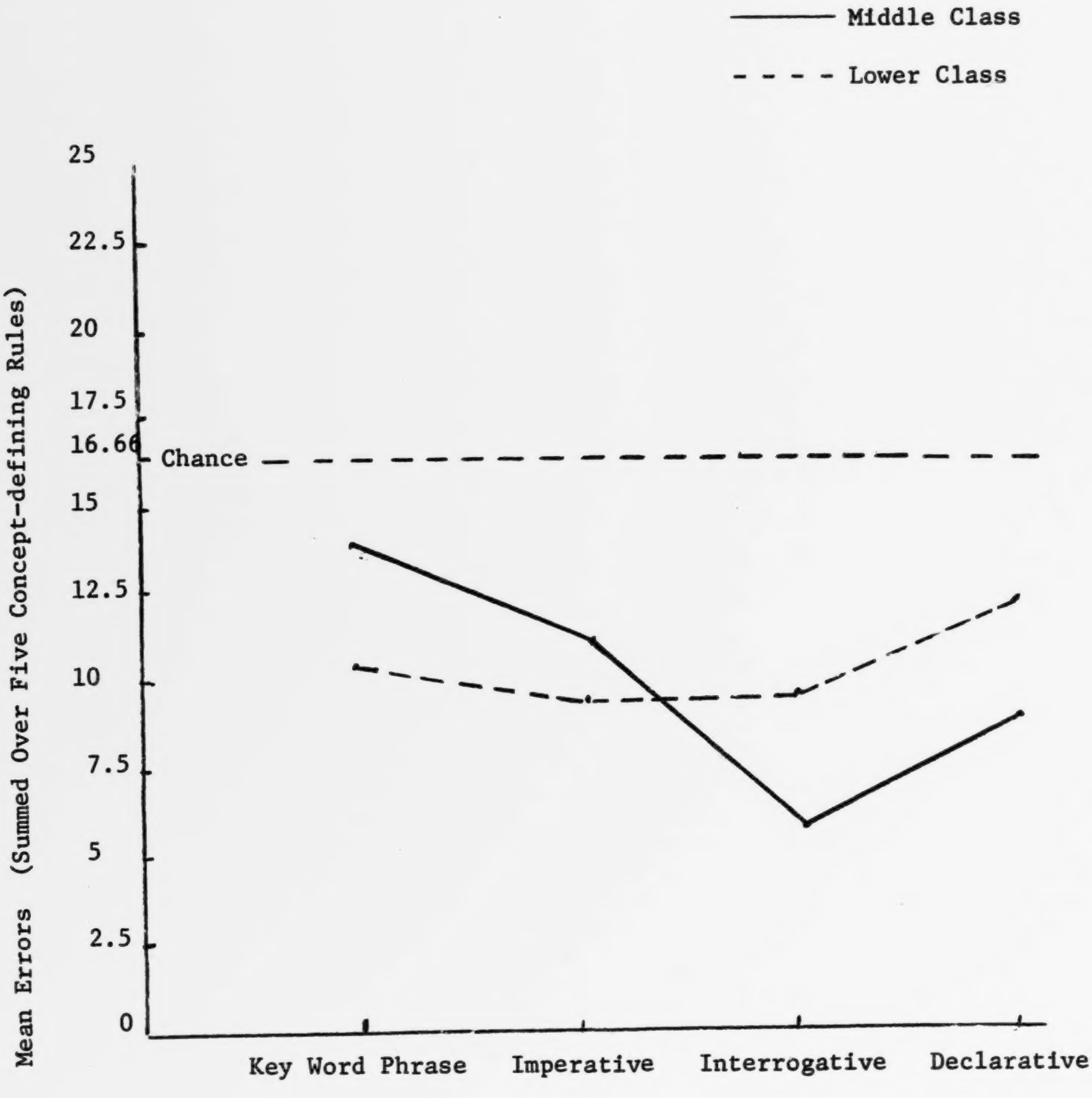


Figure 5. Performance of Middle Class and Lower Class Kindergarten Children on Four Sentence Formats

Chapter 4

KINDERGARTEN CHILDREN'S USE OF VOCAL LABELING RESPONSES IN PROBLEM SOLVING[1]

Problem

This investigation assessed the relative value of instructing kindergarten children to speak out loud functional attribute labels or non-functional object labels during a problem solving task involving selective learning, in comparison with children not instructed to label. When children respond to their own language, it would be predicted that functional verbal cues would serve to facilitate performance whereas non-functional cues would interfere.

Of parallel interest is the question as to whether the value of such oral responding with attribute labels is greater for those problems where the verbal labels are less available in the child's active vocabulary. The effect of oral practice should be greater with these labels than with labels already high in the child's verbal repertoire.

Hypotheses

1. On a selective learning task requiring the subject to identify one of three pictured objects differing only in size, young children instructed to speak aloud critical attribute labels (e.g., big) to each stimulus as it is chosen during training will perform better than (a) children who are not instructed to label and (b) children who are instructed to vocalize the common object labels (e.g., dog). This superiority will be manifested on the following three criteria: (1) Performance during training; (2) Performance on a posttest involving the same dimensions as those presented in training; and (3) Performance on a transfer test involving a stimulus dimension not included in training.

2. All children will perform better on those problems where the extreme stimulus (e.g., large or small) is the correct picture than on the problems where the intermediate stimulus is correct.

3. The superiority in performance predicted for children receiving attribute labeling training will be greater for those problems where the medium-sized stimulus is correct than for problems having the large or small stimulus as the correct picture. In other words, there will be an interaction effect between type of item and treatment condition.

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[1] A version of this chapter was accepted on the program of the 1969 meeting of the American Educational Research Association to be presented as a paper entitled, "Kindergarten Children's Use of Vocal Labeling Responses," by Robert H. McNeany and Evan R. Keislar.

Method

Subjects

The study was carried out with 42 five-year-old predominantly lower socioeconomic Negro children in a Los Angeles Elementary School. The ages ranged from 61 to 69 months with a mean age of 65 months. The mean mental age, based on the Peabody Picture Vocabulary Test, was 61 months.

Task and Materials

Each child was shown a sequence of 35mm. color slides, projected on a 6" x 8" rear view projection screen by an Argus Slide Projector. Each slide consisted of three pictures of the same object, alike in all respects except that they differed in either size, thickness, or length. For example, on one slide might appear a large cow, a medium-sized cow, and a small cow. Sample slides which were presented during training and on the posttest are shown in Figures 6, 7, and 8.

The child was presented with a series of problems on each of which he was required to point to the picture which was the correct size. A problem involved four slides. Each slide within a single problem showed the same object in three different sizes. For each problem, the three pictures were randomly positioned on each slide, with the same sized picture correct on all four slides.

Problems differed with respect to the subject of the stimulus pictures (e.g., monkeys, clowns, etc.) as well as the dimensions along which the pictures differed (i.e., size, thickness, or length). For each problem, a new set of stimulus pictures was used. The size of the correct stimulus for each problem was randomly determined. For example, on all four slides of Problem 3, the medium drum was the correct picture; on Problem 4, it was the little dog.

The first slide of each problem informed the child what the correct picture was for that problem. He was then shown a second slide containing the same pictures in a different arrangement. The child was instructed to "Find the same one." _E_ provided immediate knowledge of results for all groups by saying "That's right" when the child pointed to the correct picture. If a subject chose the wrong picture, he was told, "No, try again." Thus, each child always selected the correct picture before _E_ presented the next slide.

Design

The 42 kindergarten children were randomly divided into an Attribute Labeling Group, a Non-labeling Group, and an Object Labeling Group, each containing 14 subjects. For purposes of analysis, each of the three treatment groups was divided into two levels of mental age with each sub-group containing seven subjects. All groups received the identical visual program, with the difference in treatments being entirely in terms of the verbal commentary.

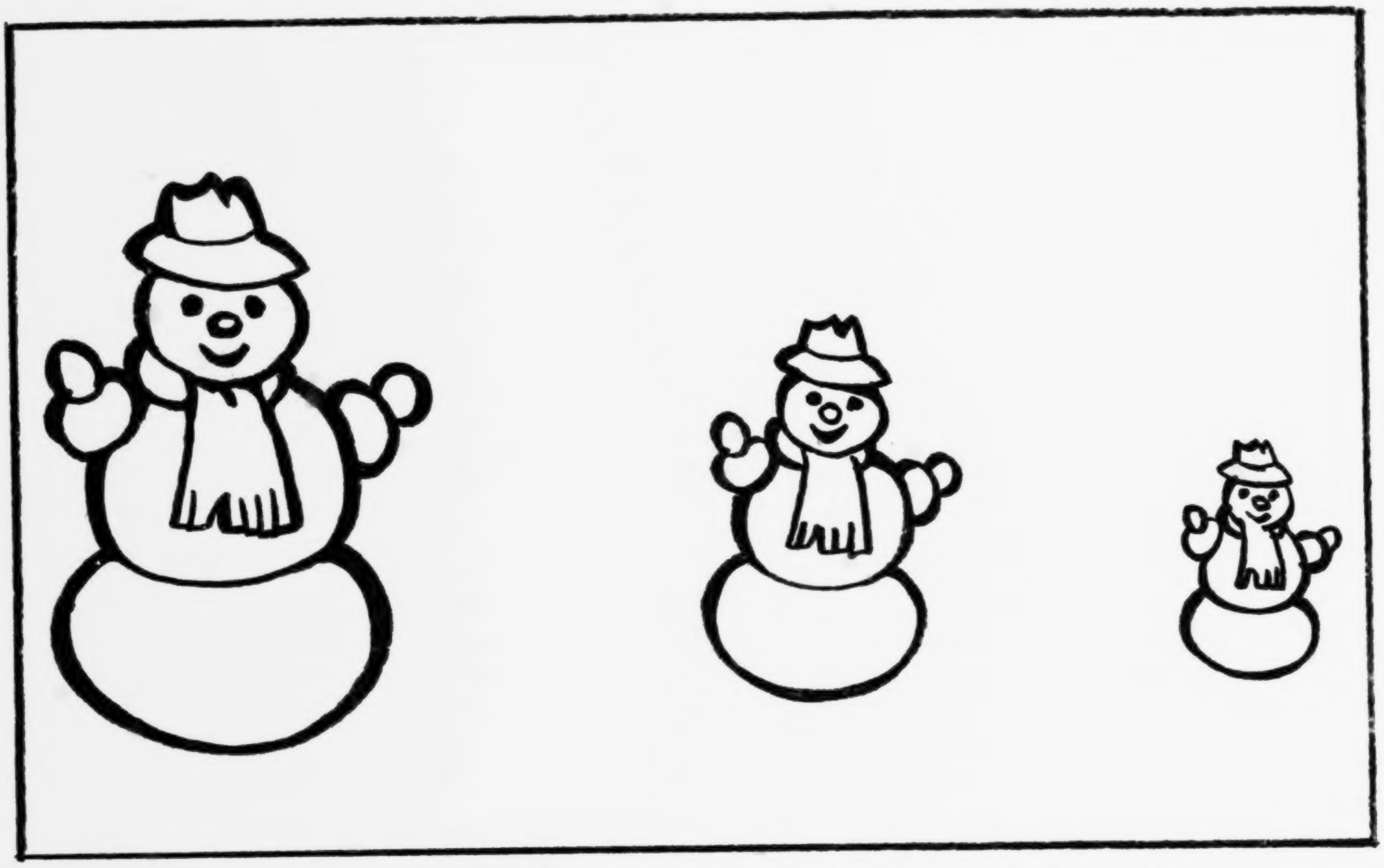

Figure 6. Sample Slide for Size Dimension Presented During Training and On the Posttest

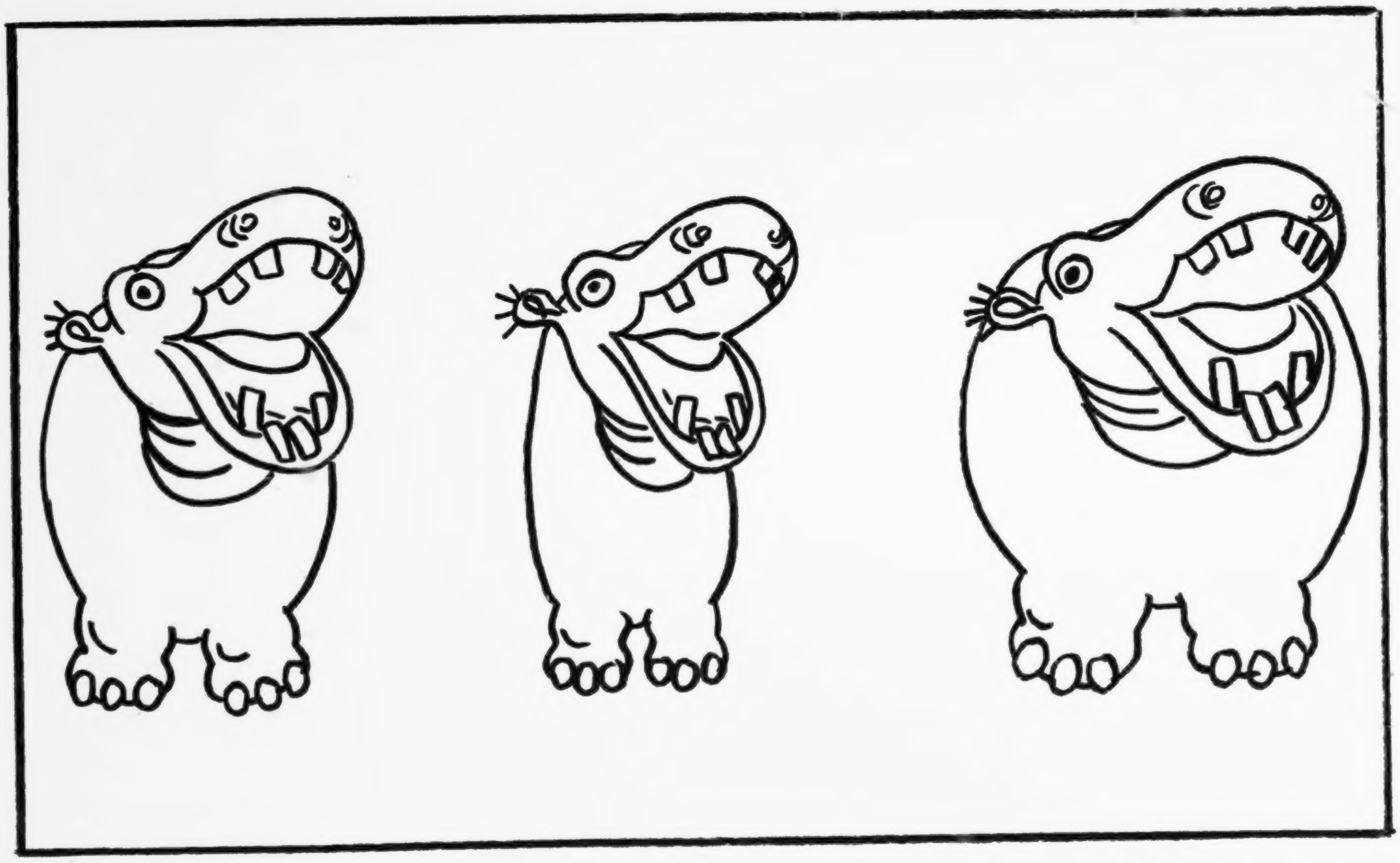

Figure 7. Sample Slide for Thickness Dimension Presented During Training and On the Posttest

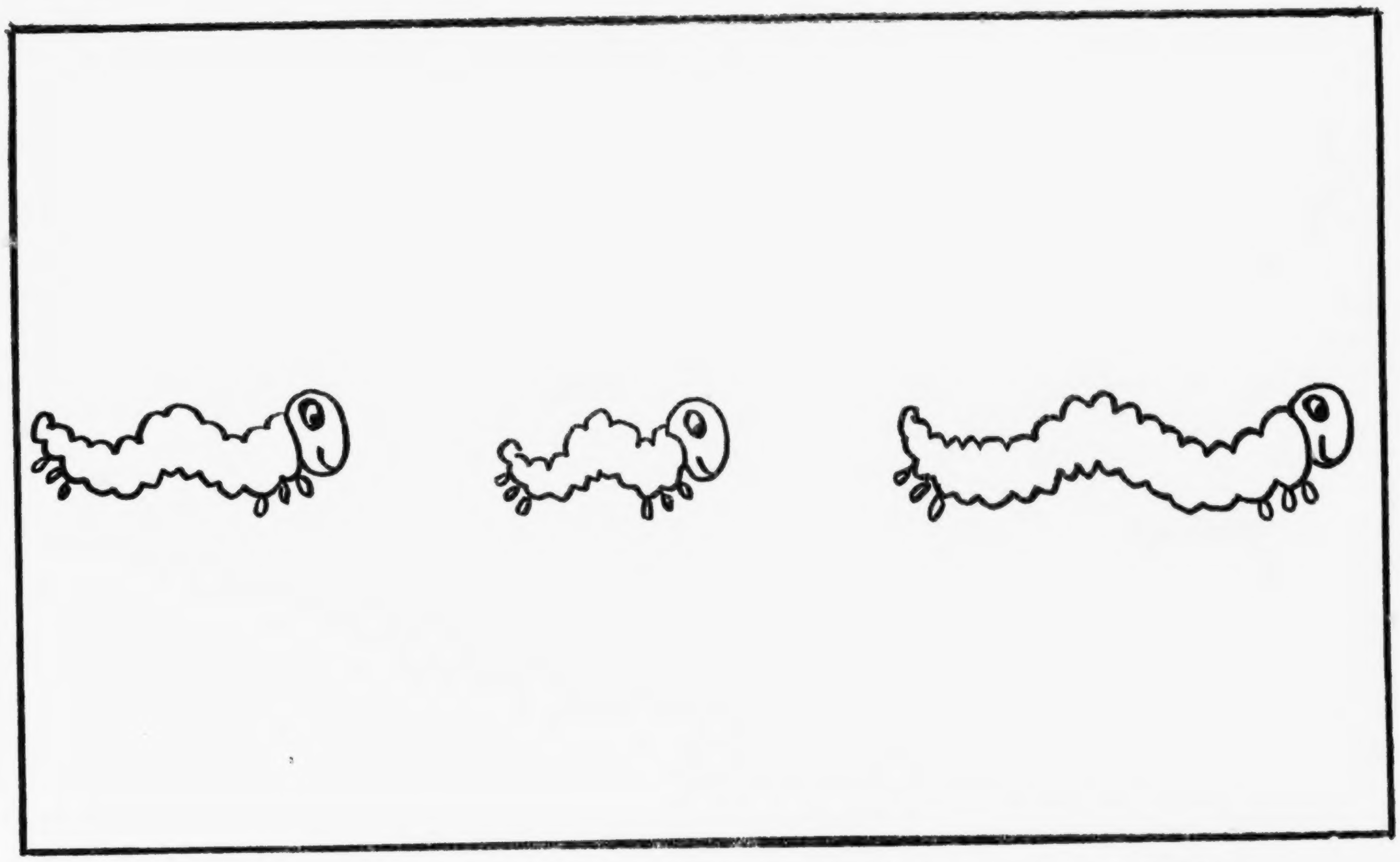

Figure 8. Sample Slide for Length Dimension Presented During Training and On the Posttest

The Attribute Labeling Group was instructed to respond by saying aloud the relevant attribute label big, medium, or little for a given stimulus immediately before pointing to that stimulus. It was judged necessary to use the same set of labels big, medium, and little for stimulus pictures which varied along the different but related dimensions of size, thickness, and length. This decision was based upon an investigation, reported earlier, with a similar learning task (McNeany and Keislar, 1966), where children in the Labeling Group were required to learn four sets of attribute labels. In the previous study, it was concluded that "...where a variety of similar labels are used, this very act of speaking may be non-facilitating or even interfering." (P. 42)

The Non-labeling Group was given no instruction to speak aloud; they responded to the same questions silently by pointing. The Object Labeling Group was instructed to say aloud the name of the object shown in the three different sizes on each slide (e.g., dog, Indian, etc.) before pointing to the correct picture. The labels this group vocalized for each problem were appropriate for the pictures but served no function since they were unrelated to the rule used for the solution.

In order to compare the results for those problems where the medium-sized stimulus was correct with problems where either the large or small stimulus was correct (Hypothesis 2), half of the problems had the medium-sized picture as correct; for the remaining problems, the correct picture was either the large or the small object.

Procedure

The total experiment required five days. Each day's session lasted from 14 to 17 minutes. The program was administered individually to each child by one of two experimenters. For half of the children in each of the three treatment groups, the program was administered by one E; for the remaining subjects the program was given by the other E. The experiment consisted of three phases: pretraining and familiarization, experimental training, and testing. These three phases are described below.

Pretraining and Familiarization

The child was brought into the experimental room and seated at a small table across from E. The pretraining program was identical for all subjects and lasted for approximately seven minutes. Its purpose was to instruct all children in the use of the attribute labels, big, medium, and little, so that differences in performance among the three treatment groups during the instructional program would not be attributed to differences in availability of the functional attribute labels.

The children were shown three different sized toy barrels. E held up the large barrel and said "Each of these barrels has a name. The name of this barrel is big." E repeated this procedure with the medium and little barrels. The child was then required to supply names for the different sized barrels as E held them up. This was repeated to a criterion of six correct labels in a row.

After this pretraining, all subjects were presented with an eight minute program designed to familiarize the children with the instructional materials. Each child was seated before the rear view projection screen described above and shown a series of eight slides, each of which was divided into three squares. The initial slide showed a kite, a cat, and a ball. The child was told, "Look at the screen in front of you. See the three boxes. There is a cat in one of the boxes. Point to the cat." The remaining seven frames were similar to the first frame. At the end of the familiarization program, subjects were randomly assigned to the Attribute Labeling Group, the Non-labeling Group, or the Object Labeling Group.

Experimental Training

On the first day of instruction, all children were presented with a training program consisting of fifteen problems described above. The first slide of each problem consisted of three pictures which were alike in all respects except that one was large, the second was medium-sized, and the third was small. Above one of the different sized pictures was an arrow.

The instructions for the Non-labeling Group were "Look at the arrow. The arrow points to the right picture. Remember which picture is right. It will be right next time too! Now point to it." The child was then shown a slide identical to the first except that the stimuli were in different positions and there was no arrow. Each child was instructed to "Find the same one. Point to the same picture." The third and fourth frames of each problem were identical to the second except for the rearrangement of the pictures. The child was then presented with another problem which differed from the first with respect to the subject of the stimulus picture as well as in the size designated as correct.

In addition to the above, children in the Attribute Labeling Group responded by saying the attribute label big, medium, or little aloud as they pointed to their choice.

Children in the Object Labeling Group, besides performing the task required of subjects in the Non-labeling Group, responded by saying aloud the name of the object class to which each of the three pictures on a slide belonged (e.g. cow, monkey, etc.) as they pointed to their choice.

If a subject in the Attribute Labeling Group or the Object Labeling Group failed to vocalize the correct label, E said "What is its name?" All three treatment groups responded by pointing and received immediate knowledge of results on each frame.

The training program presented on the second day of instruction was similar to that of the first day except for the dimensions along which the pictures differed. For problems 1-10 on the first day, pictures differed in size; for problems 11-15, the difference was in thickness. On the second day of instruction, problems 16-20 differed in thickness while problems 21-30 differed in length. (See Appendix 3.)

Criterion Tests

To test the hypotheses of the study, three dependent variables were used: (1) Performance during training; (2) A posttest; (3) A transfer test. The training scores reflect the total number of correct responses made during the instructional program. (See Appendix 4.)

The posttest, given on the day following the instructional training, consisted of 12 problems, using the same three concepts on which the children had been trained but with different subjects for the stimulus pictures. The number of frames involved in each problem was increased to five.

On the day following the posttest, subjects were presented with a transfer test consisting of 12 problems. The task required of each child on this transfer test was similar to the task required during training, but the stimulus pictures were varied in color value, a dimension on which the children had not received training. On each of the 12 problems there were five frames.

For the posttest and transfer test, all subjects received the same instructions; no child was asked to speak or provided with assistance in speaking.

Since the first frame of each problem on the tests was also used as an information frame, the child's performance on these initial frames was not included in his score. The highest possible score on the 30 training problems was 90 points, three points for each problem. A perfect score on either the posttest or the transfer test was 48 points, four points for each problem.

Results

For each of the three criterion measures (training, posttest, and transfer test), a 2 X 3 X 2 analysis of variance with two levels of mental age, three treatment conditions, and two item types was conducted using a repeated measures design. The analysis of variance presented in Table 7 shows significant differences among the three treatment groups both during training ($p < .01$) and on the posttest ($p < .05$) involving similar but new problems. Table 8 shows the mean number of correct responses for the three groups for each item type on each of the three criterion measures. These have not been presented by mental age since this was not found to be a significant variable either for main effects or for interactions.

The Newman-Keuls technique of multiple comparisons was used to test the differences in treatment means. The Attribute Labeling Group was superior to the Object Labeling Group during training ($p < .01$) and on the posttest ($p < .01$), but was significantly superior to the Non-labeling Group only during training ($p < .01$).

The results of the transfer test, also presented in Table 7, shows the mean number of correct responses for the three groups. An analysis

TABLE 7

Means and Standard Deviations of Training, Posttest, and Transfer Test Scores on Two Types of Items
(Based on 14 subjects per group)

Treatment Groups	Type of Item as Correct Response Medium		Big-Little		Total	
	M	SD	M	SD	M	SD
Training						
Attribute Labeling	32.7	5.3	39.5	3.1	72.2	7.7
Non-labeling	30.4	5.1	34.7	5.6	65.1	11.2
Object Labeling	26.4	4.0	34.3	6.6	60.7	8.4
Total	29.8	8.6	36.2	4.9		
Posttest						
Attribute Labeling	18.5	2.7	21.1	2.4	39.6	3.7
Non-labeling	17.0	2.7	20.2	2.7	37.2	5.3
Object Labeling	15.8	3.7	18.9	2.8	34.6	5.2
Total	17.1	3.5	20.1	2.7		
Transfer Test						
Attribute Labeling	15.8	3.9	18.1	3.2	33.9	6.4
Non-labeling	14.8	3.9	18.9	3.0	33.8	5.8
Object Labeling	14.5	4.1	18.1	2.2	32.6	5.7
Total	15.1	3.9	18.4	2.8		

of variance on these transfer test data (see Table 8) provides no support for the hypothesis that those children given training in vocalizing attribute labels would perform better on a transfer test.

Turning now to the differences in item type, the analysis of variance shown in Table 8 indicates there was a significant main effect for this factor. On the training posttest and transfer tests, there were a significantly greater number of correct responses for those items where either big or little was the correct size, than when the intermediate stimulus was correct ($p < .01$). The means and standard deviations for all subjects on the two types of items are shown in Table 7.

Hypothesis 3 was not supported since, as Table 8 indicates, no interactions were found to be significant on any of the criterion measures.

Conclusions

This study demonstrated that in a two-day training period involving a different but related set of training materials, a child's performance on a problem solving task involving selective learning is facilitated by training in using appropriate labels. All problems involved a consistent set of labels (i.e. big, medium, and little). The children given training in overt verbalization of these labels over this two-day period performed significantly better during training than children who saw the same stimuli but who either were not given labeling training or were taught to label the object (e.g. cow, Indian, etc.). The finding that the Attribute Labeling Group performed better during training cannot be ascribed to the fact that the children in the other two groups did not have the labels as easily available; all subjects were given pretraining in order to provide assurance that all children could easily say the three labels to the appropriate stimulus.

On the posttest, involving the same dimensions as those on which the children had received training, children in the Attribute Labeling Group continued to perform significantly better than children in the group receiving Object Labeling training but did not perform reliably better than the Non-labeling Group. On this test, all children were "on their own," that is, they received no instructions or assistance in labeling.

The superiority of the Attribute Labeling Group cannot be attributed simply to overt verbalization since a spoken response was required of the Object Labeling Group as well. The necessity of verbalizing the relevant labels correctly during training may have forced the child in the Attribute Labeling Group to pay attention to the critical features of the problem. Since the Object Labeling Group performed significantly worse than the Non-labeling Group during training, it is likely that the production of non-functional labels blocked in some way a child's ability to identify and choose the correct stimulus.

The fact that the superiority of the Attribute Labeling Group over the Non-labeling Group on the posttest was not reliable deserves comment. The total training time was not long, a total of approximately one-half hour.

TABLE 8

Analyses of Variance of Training, Posttest, and Transfer Test Scores for Attribute Labeling, Non-labeling, and Object Labeling Groups

Source	df	Training MS	Training F	Posttest MS	Posttest F	Transfer MS	Transfer F
Mental Age (A)	1	43.0	1.1	7.0	.6	15.0	.8
Treatment (B)	2	236.0	6.0**	43.5	3.5*	3.0	.2
A x B	2	1.5	.0	.5	.0	3.5	.2
Error (Between)	36	39.6		12.4		18.7	
Within Ss							
Item Type (C)	1	855.0	54.4**	186.0	66.4**	233.0	37.6**
A x C	1	2.0	.1	1.0	.4	1.0	.2
B x C	2	24.0	1.5	.5	.2	6.5	1.0
A x B x C	2	0.0	.0	1.0	.4	2.0	.3
Error (Within)	36	15.7		2.8		6.2	

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* $p < .05$
** $p < .01$

Chapter 5

ORAL AND NON-ORAL METHODS OF TEACHING READING: A REPLICATION[1]

Introduction

The present experiment is a replication of an earlier study by McNeil and Keislar (1963) in which oral and non-oral methods of teaching reading were investigated, utilizing an auto-instructional device. In the present design, the procedures are similar to the earlier study but the conditions and materials are more akin to current classroom instruction; some changes were necessary in the transition from a mechanical instrument for instruction to conventional schoolroom materials.

It was the purpose of the present study to determine whether oral responding during instruction in reading, in contrast to responding without overt speech, facilitates silent reading as measured by recognition and understanding of written words and sentences. This experiment was carried on at the kindergarten level under closely controlled conditions with replicable procedures and materials.

Review of the Literature

Studies, reports and theories related to teaching reading to young children have led to conflicting opinions regarding the value of the oral method in the teaching of reading. The point of view that saying words aloud is detrimental to learning to read dates back several decades in American education. For example, McDade (1937) and Buswell (1947) have stated that oral responding interferes with learning, particularly in beginning reading. They performed a number of experiments with groups of young children contrasting non-oral and oral methods of teaching beginning reading and concluded that the non-oral method was superior to the oral method.

More recent research, however, has raised the question as to whether vocalization might be an aid to the reader, especially where the material is unfamiliar or difficult. Edfelt (1960) found that silent speech, measured by actual muscle movements by means of an electromyograph, increased when the reading material became difficult. He suggested that lip movements during reading were not the cause of inefficient performance but an indication that the reader did not find the material easy to read.

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[1] This chapter has appeared as, "Oral and Non-oral Methods of Teaching Reading: A Replication," by Evan R. Keislar and John D. McNeil, in Educational Leadership Research Supplement, May 1968, P. 761-764.

In their original study, McNeil and Keislar (1963) found the oral method, i.e., speaking the words aloud while learning, to be superior to the silent learning program even though the criterion consisted of a silent reading test. Myresko (1966) also has referred to cases where oral reading improved a pupils's silent reading skills.

However, Sheldon and Lashinger (1966) reported no differences in achievement when they compared three methods of teaching reading, one of which emphasized vocalization. Rosenbaum (1962) found that while peer and expert (the experimenter) verbalization facilitated recognition, self-verbalization in a chorus of four did not. Vocalizing in chorus appeared to interfere with the effect of self-verbalization.

The hypothesis of the present study is in part based on the mediation theory advanced by Kendler and others that young children at the age of four and five are beginning to use verbal responses as self-cues. Where language is overtly expressed, the responses are more likely to be learned and, therefore, to function subsequently in a covert self-cueing role. The theory rests in part on evidence that kindergarten children who labelled overtly showed superior inferential behavior compared with those who did not label. (1966).

If a child says aloud words and sentences as he is learning to read, he will be better able subsequently to understand these words in new sentences even though he need not continue to say them aloud. These "silent" verbal responses act as mediating or self-cueing responses to lead the child to recognize the correct meaning of the printed words.

Hypothesis

Participating in the study were 127 five- and six-year-old children from two schools in Los Angeles representing two social classes, upper middle and upper lower. However, thirty children were not included in the final analysis because of three or more absences during training. Five additional children were not included because their high scores on the pretest indicated that they could already read most of the words to be taught. The final experiment consisted of 92 children, 46 of whom were assigned at random to the oral group and 46 to the non-oral group.

Instructional Materials and Procedures

The instructional program consisted of eight daily lessons administered by tape recording over a two-week period. The materials, except for instructions regarding speaking aloud, were identical for the oral and non-oral groups. The instructional goals for both experimental groups were the same, namely, to have each child acquire a basic reading vocabulary of twenty words, derived from lists of the most frequently used vocabulary. Each lesson was incorporated into a booklet of approximately forty-eight items or frames, one per page. The pages of the booklets were in various colors so that it could be seen at a glance that children were on the right page in accordance with the taped commentary. (See Table 9 for sample items.)

TABLE 9

Sample Items for Reading Instruction

1. Matching to Sample	Commentary
children run fast children	Mark the bottom word that is just the same as the top word.

2. Word Identification from Commentary	Commentary
cats Billy happy	Mark the word cats.

3. Matching Pictures to Printed Words	Commentary
The baby is crying. (Picture of dog) (Picture of mother) (Picture of baby)	Read the top word. Mark the picture that goes with the word.

4. Matching Printed Words to Pictures	Commentary
(Picture of children and cats running) Children and cats run fast. Mommy was crying. Billy saw the baby.	Mark the words that go with the picture.

All items involved either two or three choices with circles below each choice for marking the correct response. The children were supplied with water-filled felt-tip pens to mark their answers, and paper in the booklets was specially treated so that the circle denoting the correct answer turned green when marked with the water pen and all other circles turned red.

The variety of tasks to be performed included: matching a cue word at the top of the page to one of three words at the bottom, finding a printed word from an oral cue with no written cue, matching a picture to the proper word and sequence of printed words, and completing missing word sentences by indicating which word of three would best complete the sentence. While all subjects were required to make a choice on each item, only the children in the oral group were instructed to say the stimulus word or the correct answer aloud.

In each of the two schools children were instructed in groups of ten to fifteen, two oral and two non-oral groups per school. Lessons were presented to each group in succession in twelve to fifteen minute daily sessions. The functions of the three monitors present during the lessons were restricted to keeping order and seeing that everyone was on the proper page.

Pretest and Posttest

The pretest was used to indicate the extent to which children already could read the words in the program. On the first day, the children were initially given an orientation program in which they learned the lesson procedure including how to respond by marking. The rest of the first day's session involved the pretest which was designed to assess the children's knowledge of reading as demonstrated by their ability to identify pictures and to read words.

The posttest (see Appendix 5), administered on the tenth day of the experiment, consisted of 50 items pertaining to the twenty-word reading vocabulary which was the objective of the teaching program. Reading knowledge of each word was tested in several ways: matching to sample, sentence completion tasks, and identifying words and sentences from oral cues and picture cues. The criterion, therefore, dealt with the ability to understand the printed material as well as to recognize the differences between printed words and to identify the printed form of the spoken word.

Results

In Table 10 are shown the mean number of correct items on the pretest and the posttest along with the respective standard deviations for the experimental and control groups. These data show that the two groups did not differ in their initial ability to perform on the reading task. A t test was used to compare the differences between the oral and non-oral groups. The difference, significant at the .05 level, indicates that children in the oral group achieved more success in beginning reading than children who were not given opportunity to vocalize while learning to read.

TABLE 10

Pre- and Posttest Scores for Oral and Non-oral Groups

Groups	Pretest Mean	Pretest S.D.	Posttest Mean	Posttest S.D.
Oral (N=46)	6.4	2.2	29.4	8.7
Non-oral (N=46)	6.3	1.7	26.1	8.6
	t=.33		t=2.06*	

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* $p < .05$

Discussion

Support has been shown for the hypothesis that the oral method of teaching beginning reading is significantly superior to the non-oral method. This is so, at least, in the initial stages of learning to read where the criterion is recognition and comprehension of the printed word rather than speed reading. In this study, the oral method of teaching reading was defined as one in which the child was required to say printed words aloud as he selected a choice on each item. In the non-oral method, children were simply instructed to choose an alternative for every item without responding orally; as they read silently, they indicated their comprehension only through the selection of their choices.

Even though the criterion test required only silent reading, the oral group performed significantly better. It is noteworthy that proficiency in silent reading can occur from an instructional procedure that demands vocalization. The findings are consistent with the mediation theory that if young children are given instructions to respond overtly, they subsequently will be able to produce this response as a covert self-cue to bring about appropriate behavior. The replication study has demonstrated the value of the oral response under modified conditions indicating that the original conclusions are generalizable.

Chapter 6

TRAINING IN LISTENING TO AND APPLYING CONCEPT-DEFINING RULES[1]

Introduction

The major purpose of this exploratory study was to discover ways in which kindergarten children might be taught to listen to a rule presented by a teacher and then to apply this rule to a succession of events. The kind of rules involved in this study were those which define concepts. The application of the rule consisted of identifying positive and negative examples of the concepts. Since most concepts in school are learned in this deductive fashion, the ability to listen to and apply concept-defining rules is a valuable learning outcome for a child starting school. Actually saying the rule aloud to provide self-cues might be an important way in which this instruction could be assisted. Therefore, a primary question for this investigation was to determine whether rule-learning is facilitated by requiring the pupil to speak the rule aloud as he applies it in a succession of items.

The task used in this study possesses a number of features:

1. The task involves deductive rather than inductive learning.

2. It requires rule utilization and not rule verification.

3. The four rules selected are the conceptual types found earlier in this project to be appropriate for this population.

4. From the viewpoint of languge learning, the task requires an understanding and use of certain function words.

5. In an effort to approximate conditions within a classroom, both rule and instances were presented at a level of complexity or "noise" considerably above that used in laboratory experiments.

The study was carried out in two stages. The initial goal was to develop an effective instructional program for teaching children to apply new concept-defining rules. This oral program was evaluated by comparing the performance of an instructed group of children with that of an uninstructed group. Subsequently, a non-oral version of this program was prepared and tried out with another sample of children from the same population. The performance of these children was compared with that of the children in the oral group as well as the uninstructed control.

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[1] A version of this chapter was accepted on the program of the 1969 meeting of the American Educational Research Association to be presented as a paper entitled, "Teaching Kindergarten Children to Apply Concept-Defining Rules," by Evan R. Keislar and Samuel R. Schutz.

Deductive versus Inductive Concept Learning

Most experimental studies in concept learning use an "inductive" approach. Bourne (1966) classified such studies into two groups: Those based on a reception paradigm and those involving a selection paradigm. In the former case, the subject is presented with a series of instances which he is required to identify as either positive or negative. As he makes his judgment he is given information as to whether he is right or wrong. When the subject finally reaches a criterion of a specified number of correct responses in a row he is said to have learned the concept. Under the selection paradigm, the subject is presented with a large array of examples simultaneously. Under these circumstances, the subject, not the experimenter, selects the instances for testing. The memory load is greatly reduced since information as to whether an instance is positive or negative remains available to the subject after he makes his test. The subject is free to develop and adopt a strategy of gathering information on his own.

These two approaches to the study of concept learning may well involve much of the same kind of subject behavior. Under either paradigm, it is possible for the subject to learn to make the appropriate responses without being able to verbalize the rule; he may never formulate and test hypotheses on his own. Certainly a large part of early learning is of such a non-verbal nature. However, even the kindergarten child frequently uses verbalization to assist himself in solving concept identification problems. Here the child may well be formulating hypotheses by using familiar rules or adaptations of such rules. In any event, although the learner may be given a varied amount of guidance in this task, he eventually formulates for himself the rules he finally uses. The process is inductive in the sense that the information the child receives relates to the instances; the rule must be derived from the information given.

However, inductive procedures are rarely adopted in the classroom. When learning a new concept the child is usually given the rule which defines the concept and then is asked to apply this rule by identifying positive and negative instances of the concept under a variety of practice conditions. Carroll (1967) says, "The most critical difference between school concept learning and concept learning in psychology experiments is that the former is, for the most part, deductive and the latter is generally inductive." Ausubel (1963) says that, "Most classroom instruction is organized along the lines of reception learning."

Englemann (1968) describes deductive processes as an important aspect of induction. He says:

> Current curricula often fail to demonstrate the character of logical reasoning and systematic investigation. This failure is closely related to an apparent misunderstanding of induction and that an inductive approach proceeds according to the strategy of "deduction." The difference between deduction and induction is merely a difference in which part of the argument is given. Both use the same argument form: Glasses break. This is a glass. This breaks. When the problem is

> inductive, one is given the last two parts; when the problem is deductive, the first two parts are given. The child who understands logical reasoning understands this argument form, whether the specific problem is one of filling in the first or the last part. Typical inductive training proceeds according to the seemingly tenuous assumption that the child will somehow learn this argument form from experiences that never bring the various parts together in any cohesive manner, or never tie in with deductions and inductions with which he is familiar. (P. 55)

Englemann goes on to indicate that learning to apply rules is highly important for the young child.

> The most important kind of induction the young child can learn is that rules that are given to him in the classroom apply to various instances. If the rule involves adding one to a number, he should learn that the rule holds for any situation he chooses to test. The inductive test of effective rules is where primary emphasis should be directed, because this emphasis familiarizes the child with the basic argument form of logical reasoning, and it demonstrates the value of rules. To learn a rule is to learn a shorthand solution to a range of problems. The child who learns to use the rules in this way also learns important skills connected with following instructions. (P. 55)

The deductive aspects of this task may be an important prerequisite to the handling of inductive type problems. In the current investigation this possibility was explored by including inductive concept identification problems as one of the final criteria.

Rule Verification and Rule Application

An important component of inductive concept learning is simply that of verifying the rule, that is, of testing a hypothesis. Two investigators have carried out studies in this field. Wason (1959), using concept-defining statements along with positive instances of the concept, asked the subjects whether or not the rule defined the concept as represented by a specific exemplar. In other words, subjects were asked to verify the rule. In some cases the instance presented was positive, in others it was not. Some of the statements were worded affirmatively, others negatively. Wason found that false negatives took much longer to verify than true affirmatives.

Trabasso (1967) read the concept definition to the subject and then presented an instance. The time taken to verify whether the rule was true or false was recorded. Trabasso found that the addition of negation greatly increased the time required for both conjunctive and disjunctive types of rules. Again it was much easier to confirm the positive than to disconfirm a false negative.

In the present investigation, the emphasis was placed not on verifying but upon applying rules. The differences are indicated in Table 11, where it will be noted that these two approaches present the subject with quite different tasks. In the case of rule verification, the subject is asked to test the validity of the rule, assuming that the instance given is indeed a positive representation of the concept. In the case of rule application, however, the task is to determine whether the instance is positive or negative, on the assumption that the rule is truly valid. Referring to the table, it can be seen that the information as to whether the judgment of the subject is correct or not leads to quite different actions. Of particular importance is the source of the rule. If the individual proposes the rule to himself, verification can be equated with hypothesis testing. On the other hand, if the experimenter presents the rule to the subject for verification, it is similar to the studies of Wason and Trabasso on rule verification. Rule application occurs in inductive learning of concepts after the individual has received some assurance that the rule is indeed applicable. Where the experimenter or the teacher supplies the rule, evidence that the student truly understands the concept is provided when the rule is appropriately used.

Bourne has pointed out (1966) that there are two components in rule utilization: the rule itself and the attributes. In concept identification problems it is presumed that the attributes have already been experienced, that is, learned. The individual is able to make discriminations among the values of a dimension and may also be able to label them. When he is asked to identify the concept, he makes use of this prior learning of the attributes so as to classify or sort on this basis. The task of the typical concept identification problem is to determine which attributes are relevant and which are irrelevant. A more basic task in these problems is learning the type of conceptual rule involved in the particular concept. Haygood and Bourne (1965) showed that subjects who were told which attributes were relevant but not the rule did better than subjects who were told the rule but not the relevant attributes. Subjects who were given neither of these components made more errors than those who had either one or the other.

King (1966) working with adults as well as children, 6, 9, and 12 years of age, told his subjects which attributes were relevant. The inductive concept identification task was to identify whether the rule being used was conjunctive or disjunctive. He found that at every age level the disjunctive rule was more difficult than the conjunctive. King found that his subjects, especially the six-year-olds, frequently solved the problems but without being able to state the rule. Three stages in rule learning were suggested by his study. "In the first, children are not able to discover the rule nor to profit from verbal tutoring; in the second, they are not able to discover the rule by induction, but can learn to utilize it with the aid of verbal tutoring; in the third, they can discover the rule and utilize it without verbal tutoring." His study suggests that many children would profit from instruction during the rule utilization phase.

The task involved in this experiment was that of listening to a rule and then applying it to a variety of instances. While this task seems fairly straight-forward, the evidence from the study reported in Chapter 3 indicates that it is one in which performance can be considerably improved with practice. This is true even though the attributes are familiar to the child and the definition of the concept is fairly simple.

TABLE 11

Comparison between Rule Verification and Rule Application

	Rule Verification	Rule Application
Assumption:	Validity of rule indeterminate	Rule is valid
Task:	To verify rule	To identify instances as positive or negative instances of the rule
Question Posed:	"This is a positive instance of the concept: could the rule define that concept?"	"Are these instances of the concept as defined by the rule?"
Concluding Action:		
If answer to the above question was		
"Yes" and was correct	Retain rule	Identify instance as positive
"Yes" and was incorrect	Reject rule	Identify instance as negative
"No" and was correct	Reject rule	Identify instance as negative
"No" and was incorrect	Retain rule	Identify instance as positive
Name of Process:		
If the rule given to subject by:		
1) Subject himself	Hypothesis testing	Rule application
2) Teacher or experimenter	Rule verification	Deductive concept learning and rule application

Conceptual Rules

Haygood and Bourne (1965) have indicated that where two focal attributes partition a population, the 10 distinct rules constitute five pairs, one member of a pair being in one sense the complement of the other. The five pairs of conceptual rules are: affirmation and negation; conjunction and alternative denial; inclusive disjunction and joint denial; conditional and exclusion; biconditional and exclusive disjunction.

In Chapter 3, it was noted that kindergarten children from lower class neighborhoods had no difficulty with affirmation, which was a very simple kind of rule for them to follow. The four conceptual rules adopted for this investigation, therefore, were negation, conjunction, inclusive disjunction, and joint denial. In their experiment, Haygood and Bourne used the last three rules, but instead of negation, which was not a difficult rule for their subjects, they used the conditional.

The ability to use these rules involves language learning, particularly listening comprehension, where the child responds to the critical words in the rule. The different conceptual rules in this experiment require that the child pay attention to the following three words: not, and, or. These are the "little words," already discussed as function words in Chapter 2, with which, according to Bernstein, culturally deprived children have difficulty. It would seem reasonable that the child who has been required to verbalize overtly the rules involving these function words will be more likely to pay attention to them and to use them appropriately.

Level of Complexity

Laboratory studies have usually used simple and highly controlled material for the experimental tasks. For example, Wason and Trabasso each used the dimensions of color, size, shape, and number. Having students identify concepts such as "the large red circle" offers considerable precision. The strategy involved is that of building a model which applies to highly simplified instances and to increase its complexity slowly during successive experimental sequences. In this way a final model of high complexity can be developed.

An alternate strategy is to start with the highly complex concepts and materials of the classroom and to attempt to deal with these in order to discover the relevant dimensions. In later stages one can then carry out studies on a more abstract, controlled basis, using the dimensions which have been isolated in the preliminary stage. This latter strategy has considerable merit in that experimental studies carried out in laboratory settings do not consider important classroom variables.

In the present project an intermediate position was taken. The complexity of the tasks varied in terms of the irrelevant factors present. The concepts adopted were similar to those the child might be exposed to in school. The attributes, e.g., earrings and glasses, were everyday objects of the child's environment. (See Appendix 6 .) Since the child was required to identify pictures in which these objects were present, a major consideration was whether the child interpreted the pictures in the way the examiner intended. A variety of drawings were used so that a good deal of irrelevant material was always present.

Another source of complexity in the present study was the mode of presentation of the rule. Here the subjects had to learn to extract the rule when it was embedded among irrelevant statements. That is, for every problem in the final task, the children were presented with a rule as well as with an irrelevant sentence. Given this "noisy" stimulus the child had to select the sentence containing the information which was appropriate for the question being posed.

Criterion Tests

Two types of criterion tests were used: rule application and concept identification. The first of these involved deductive learning of the rule while the second required identifying the correct rule through induction.

1. Rule Application Test. On the rule application subtest, there were eight problems, two for each of the four conceptual rules. The test is presented in Appendix 7 . The types of problems used are presented here arranged according to the type of conceptual rule. However, in the actual test the items were scrambled so that no two rules were ever given in succession.

Negation	Tony's mother does not wear a watch.
	The new teacher does not wear glasses.
Conjunction	Fatso Pig is wearing a bell and has spots.
	Richard's sweater has buttons and sleeves.
Disjunction	The lady bus driver wears earrings or a necklace.
	Betty's brother is dressed like a policeman or a spaceman.
Joint Denial	Jimmy's favorite present has no wheels and no ribbon.
	Lilly's purse has no handle and no zipper.

For each of the problems in the test, the children were told a story in which the characteristics of a missing object or person were described. This description constituted the concept-defining rule. The goal for each problem was always stated at the beginning of the story. E.g., "Jimmy has lost his sweater. Let's help him find it." For one-half of the problems, the critical concept-defining rule was given immediately, with an irrelevant statement second; for the other half of the problems the reverse order was followed. After the rule was given, the child was shown a card with two or three pictures and asked to identify which one might be the object or person. The correct picture represented the positive exemplar of the concept while the distractors represented negative instances.

The following is a typical problem:

> "Who could be Edward's new teacher? The new teacher does not wear glasses. He has a ring on his finger. Point to the one that could be Edward's new teacher." The child

was then shown five cards, each showing a picture of a face with glasses and one without glasses. The instruction to "point to the one who could be Edward's new teacher" was repeated with each card.

There were five cards for each problem, with two or three alternatives per card, making a total of 10 to 15 pictures per problem. In order to bring the story to a satisfying conclusion, the positive instance (the missing object) on the last item of each problem was identified by the experimenter.

Before the eight problems were presented, all the children were given special preliminary training in answering these kinds of questions. This training consisted of two parts. In Part I, the child was given a sample problem involving affirmation (a rule not used in the experiment because it was too simple) and then required to apply the rule to a set of three items, without error, twice in succession. If the child missed any of the items in this problem, the instruction was repeated with as much additional assistance as was necessary until the entire set of three items was passed without error, two times in a row. In Part II a new affirmation rule with five items was presented to make sure that the child truly understood what to do. It was found that in practically all cases those children who had demonstrated competency in following instructions in Part I passed all the items in Part II, providing some assurance that the instructions to the major part of the test were fully understood.

2. Inductive Concept Identification Test. The second part of the criterion test consisted of three concept identification problems, one problem being given to the children each day over a three-day period. In Appendix 8 will be found Problem 1. For each of these concept identification problems, the child was shown a card on which were drawn rectangular boxes. Each box contained two pictured objects. The child was told to find the "correct" box on each card. After the child pointed to the correct picture he was given confirmation and the next card was shown. There were a total of eight cards per trial. A new set of cards was presented for the second trial and then the two sets were shown again for the third and fourth trials. If necessary, as many as eight trials could be given, continuing the procedure of the first four trials, or until the child could select the correct box on eight successive cards.

The rules for the inductive problems were as follows:

(1) Joint Denial "Not a comb and not a ring."

(2) Alternative Denial "Not a carrot or not pants."

(3) Disjunction Involving Conjunctive Attributes "Bone and hammer or leaf and tape."

It will be noted that the rule used for the first problem, Joint Denial, was also used in the rule application program. The second problem involved a fifth conceptual rule outlined by Haygood and Bourne, Alternative Denial, the complement of Conjunction. The third problem involved quite a difficult rule, Disjunction Involving Conjunctive Attributes.

In scoring the inductive problems, the total number of errors on all trials combined was taken as the measure of performance. So as not to bore children by repetition of a task once mastered, for the children who reached the criterion by passing on a single trial (a set of eight cards without error), it was assumed that they would have continued without error for the full eight trials.

Subjects

As indicated earlier, the program was administered in two stages. In the first stage, the original oral program was given to eight children in a day care center, with eight children from another day care center in the same neighborhood serving as a control. Unfortunately, it was not possible to provide instruction at both sites, hence random assignment to both treatments within each center was not undertaken. Because of attrition, the final number of subjects for this stage was 12, with six in the Oral group and six in the Control. In the second stage, eight additional children were given a Non-oral adaptation of the original oral program. Children in this Non-oral group selected responses for multiple choice items, and answered only "Yes" or "No" to questions. The subjects in all three groups were Negro children, approximately five years of age, ranging from 58 to 62 months.

Instructional Program

The instructional program for the Oral group consisted of four sections. The first unit dealt with negation, followed by conjunction, disjunction, and joint denial. Within each of these units a sequence of six major steps was followed: (1) Children were presented with problems in which only the rule was given. The child was asked to apply this rule to a single item, for example, "Which picture shows a dog with no collar?" (2) The child repeated the rule "A dog with no collar" and then selected an appropriate picture from among three alternatives. In this stage, children were presented with the same rule, repeated the rule, and then selected pictures from a series of items. (3) The children were presented with the rule describing an object. They were then asked to point to the object, for example, "Rover is a dog with no collar. Point to Rover." Here the children again repeated the rule and were expected to identify the picture on one item only. (4) The procedure was the same as in Step 3, but the rule was applied to a series of items. (5) Each conceptual rule was presented along with the irrelevant statement. Again the child repeated the rule and identified the correct picture. (6) The same sequence was followed as in Step 5, except now the child applied the rule to a series of items.

The oral response for each rule required the child to repeat the relevant part of the rule for purposes of self-cueing. In the example given above, the child would be instructed to repeat "no collar" for each card in this series.

Children were shown 20 examples of each of the four conceptual rules, using the attributes listed in Appendix 6 . The rules were presented so that a fairly random sample of attributes were used. (Appendix 9 presents a sample lesson from this instructional sequence.)

For the instructional program, the attributes consisted of separate pictures duplicated from a standard picture file. The use of a file containing a large number of pictures allowed the efficient production of the many frames required for training. The positive instances of the conceptual rules of negation and disjunction involved only one picture while the other two rules, conjunction and joint denial, required two pictures placed together.

The general format for instruction used stories as a setting for the task activities. For example, the following story was used to teach negation to the Oral group:

"It was late at night and everything was quiet at the toy store. All the people were asleep except the toy people. 'I'm hungry,' whispered the toy cowboy. 'I'm hungry too,' said the toy Santa Claus. So the toy people decided to look for something to eat.

(Problem 1) "Let's find all the things the cowboy picked to eat. He did not eat a pie. Say, 'not a pie'... Point to one of the things the cowboy picked to eat. (Show first card consisting of two picture choices, one of which is a pie.) Find something else the cowboy chose to eat. (Show second card, also with two choices, one of which is a pie. Repeat procedure for next five items.)

(Problem 2) "Now let's find all the things Santa picked to eat. He did not eat popcorn. Say, 'no popcorn'..."(Five pictures were then shown.)

Administration of Program

All children were given tests and instruction on an individual basis by the experimenter. An assistant was assigned the task of recording the child's responses and other anecdotal material. All tests and instruction involved showing the child pictures along with a commentary. Every effort was made to establish rapport with the child but without affecting the standard instructions. The lessons or tests took between 8 to 12 minutes each day. The testing and instruction were carried on in an area where, unfortunately, occasional disturbances were created by staff or pupils entering the room. For any given child, these probably occurred once or twice during the entire experiment.

Table 12 presents the testing and instruction schedule for the 13 day period. On the first day there was a short orientation in which the children were put at ease by the experimenter; they were asked simple questions involving picture identification. The second day all subjects were given the rule application pretest. The children in the two experimental groups then came in every day for a period of seven days. The first three of these daily lessons dealt with negation, which was judged to be of central importance. The three conceptual rules, conjunction, joint denial, and disjunction were then taught in one daily lesson apiece for the next three days. On the last day of instruction the experimental groups received practice using all four rules. Systematic reviews of all the previous learning were held at the beginning of each daily lesson. Four days were then devoted to the two posttests. On the first day, the rule application test was given, and on each of the remaining three days one of the inductive concept identification problems.

TABLE 12

Schedule for Testing and Instruction

DAY	ACTIVITY
1	Orientation
2	Rule Application Pretest
	Instruction:
3	Negation
4	Negation and Review Items
5	Negation and Review Items
6	Conjunction and Review Items
7	Joint Denial and Review Items
8	Disjunction and Review Items
9	Review Items on Total Instructional Program
	Posttests:
10	Rule Application Test
11	Inductive Concept Identification, Problem 1
12	Inductive Concept Identification, Problem 2
13	Inductive Concept Identification, Problem 3

Results

First Stage

In this section, the Oral and Control groups will be compared. Although subjects were not randomly assigned to these two groups, the populations from which they were drawn appear to be so comparable that the usual tests of significance have been made. However, it should be kept in mind that interpretations of the results are subject to this reservation.

On the rule application test, the Oral group moved from a mean error score of 26.8 on the pretest to a posttest mean of 15.5, a gain of 11.3 points. The Control, however, showed on the average little improvement; they had a pretest mean error score of 22.5 and a posttest mean score of 21.3, a gain of 1.2 points. The difference between the two gain scores, using a nonparametric test, is significant at the .05 level. The analysis of covariance (see Table 13) also revealed significant differences, thus supporting the conclusion that the oral program did produce a reliable improvement in the ability to apply rules.

On the concept identification problems, the Oral group was considerably better than the Control. The overall mean error score for the instructed group was 15.3 while the mean for the Control group was 27.2. On the basis of a 2 x 3 analysis of variance (see Table 14), using a repeated measures design with two treatments and three problems, it may be stated that the difference between the two groups was significant on these inductive problems.

Final Stage

A few weeks after the completion of the oral program, the non-oral program was administered to eight children drawn from the same day care center as the Oral group. While the assumption of random selection is thus not technically tenable, the fact that these children were from the same population and received instruction in a standardized format seems to justify the use of statistical measures for random samples. Thus all three groups, the Oral and the Non-oral instructed groups and the uninstructed Control group have been included in the same analyses.

The mean error score on pre- and posttest administrations of the rule application test for the Non-oral as well as the Oral and Control groups are given in Table 15. It may be noted that the Non-oral group showed a gain of 4.6 which was intermediate between that of the Oral and the Control. An analysis of covariance, presented in Table 16, failed to show a significant difference among the three groups. In Figure 9 are presented the graphs for each of the three groups to show the change from pre- to posttest for each of the four types of rules. It should be noted that the Oral group improved a good deal on each of the rules, the Non-oral improved on Joint Denial and Negation, whereas the Control group showed little pre- post differences on any of the subtests.

Figure 10 shows the mean progress over each succession of trials for the three concept identification problems, by treatments. The results of a repeated

TABLE 13

Analysis of Covariance on Rule Application Test for Oral and Control Groups With Deductive Pretest as Covariate

Source	df	MS	F
Total	10		
Error	9	32.28	
Treatment	1	227.13	7.04*

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*$p < .05$

TABLE 14

Analysis of Variance on Inductive Concept Identification Problems for Oral and Control Groups

Source	df	MS	F
Between Subjects	11		
A. Treatment (Oral vs. Control)	1	1284.03	7.28*
Subjects within Groups	10	176.41	
Within Subjects	24		
B. Problems	2	3545.59	60.65**
AB	2	1.69	
B x Subjects within Groups	20	58.46	

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*$p < .05$

**$p < .01$

TABLE 15

Pretest and Posttest for Rule Application Test for Oral, Non-oral and Control Groups With Deductive Pretest as Covariate

Group	N	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD
Control	6	22.5	3.0	21.3	2.9
Oral	6	26.8	2.8	15.5	3.1
Non-Oral	8	24.5	2.9	19.9	3.2

TABLE 16

Analysis of Covariance on Results of Rule Application Test for Oral, Non-oral and Control Groups With Deductive Pretest as Covariate

Source	df	MS	F
Total	18		
Error	16	49.4	
Treatment	2	106.4	2.15

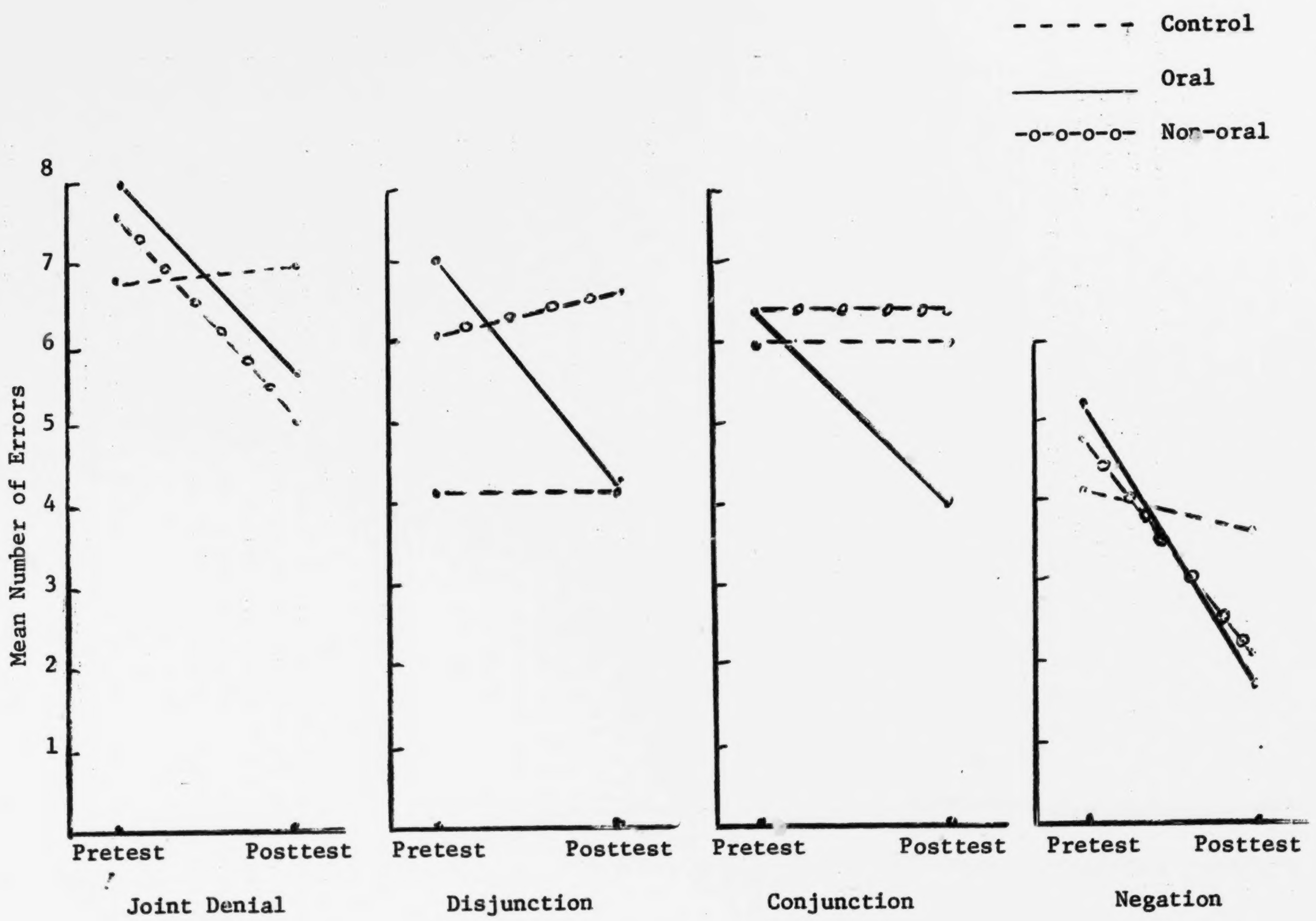


Figure 9. Pretest and Posttest Errors on Rule Application Test by Conceptual Rules for Each of Three Groups

measures analysis of variance for total scores (see Table 17) show that the differences among groups are highly significant. On the first problem, Joint Denial, the children in the two instructed groups showed rapid learning of the rule, whereas the Control group presented a pattern of very slow acquisition. A similar pattern can be seen for the second concept identification problem, Alternative Denial, even though this was somewhat different from the kind of rule encountered in the program. While the third concept identification problem, Disjunction Involving Conjunction, was much more difficult for all children, the difference between the progress of the instructed and uninstructed group is still apparent. It is of interest to note when, at the conclusion of the individual testing situation for each problem these children were asked how they knew which picture to select, not one was able to state the rule at all.

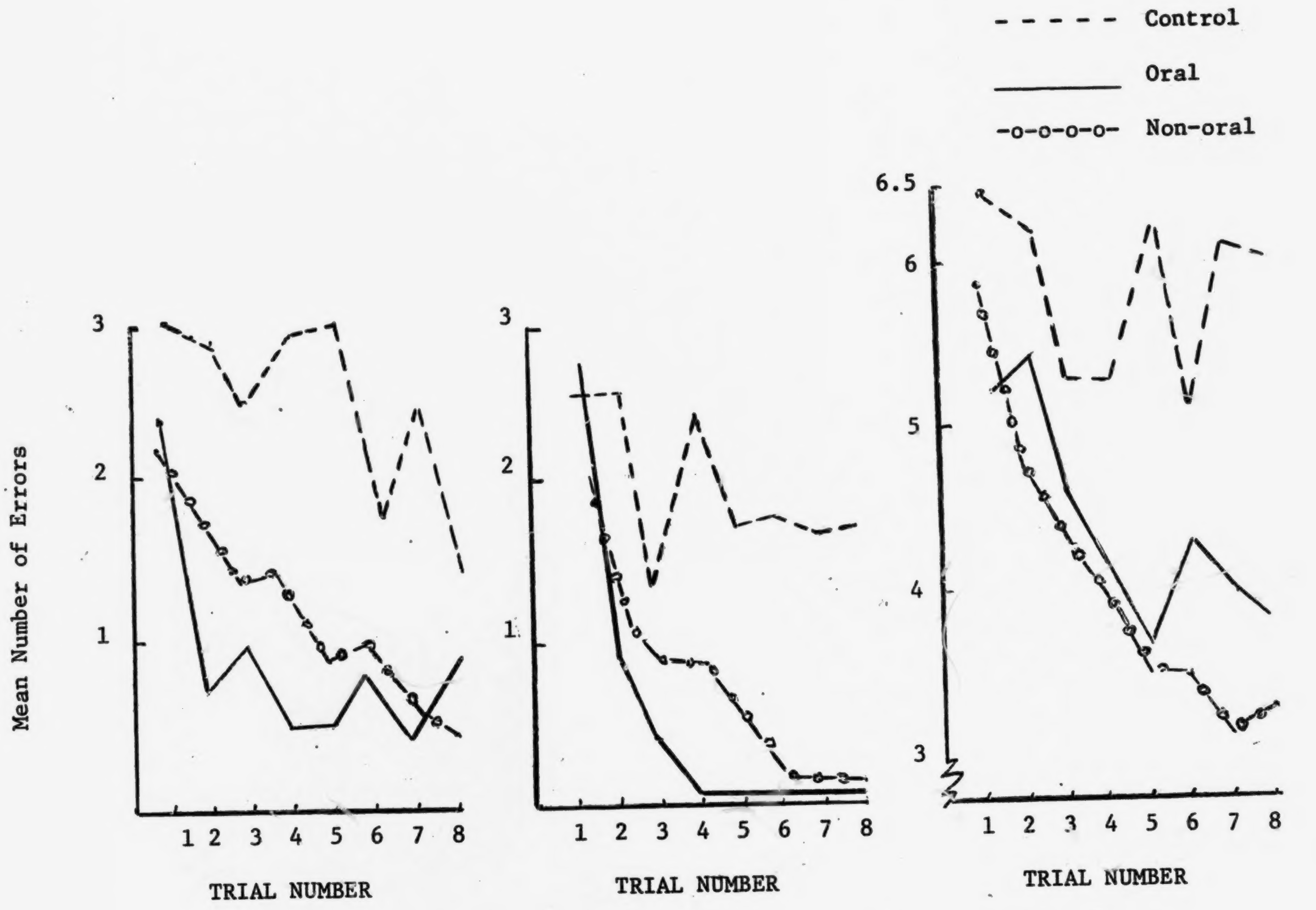
Discussion and Conclusions

The results from the first stage clearly indicate that the oral instruction program was effective in improving performance on the rule application task. This finding is of particular interest since the posttest included problems which were somewhat different from those given during training. The training consisted of instances in which each attribute was a total picture in itself, e.g., a box containing a toy car and a hat. The posttest, however, presented the child with instances in which the attributes were part and parcel of the total picture, e.g. a lady with earrings and a hat. The posttest was thus to some extent a transfer test.

On the inductive learning test the superiority of the experimental groups over the control can be understood in part through the fact that the test involved the same kind of problems as the training. Part of the superiority of the experimental groups may therefore be attributed to specific factors such as familiarity with the pictorial material. Even so, however, the inductive problems on the test were very different from those given during instruction; this finding suggests the importance of exploring further the possible transfer values of such instruction in rule application.

The improvement between pre- and posttest for the instructed group is fairly substantial. While there appears to be far more room for improvement on the part of these young subjects on this task, the posttest was designed to be fairly difficult so as to tease out any differences between the experimental groups which might differentiate the training effects. A number of other factors which were involved in the posttest performance need to be considered: 1) The program itself was fairly short with only a limited amount of time which these children actually spent in training. The lessons took approximately 10 to 12 minutes per day with a total instructional time of about one hour and a half. 2) While the drawings presenting the attributes had been checked for familiarity and clarity with a comparable population, these children may not have had as much experience with the attributes as was anticipated.

Comparing the posttest performance of the Oral and the Control, there is dramatic evidence to support the value of the kind of instruction provided in this experiment. The Oral group showed very clear improvement



Problem No. 1:
Joint Denial

Problem No. 2:
Alternative Denial

Problem No. 3:
Disjunction Involving
Conjunction

Figure 10. Mean number of Errors by Trials on Each Concept Identification Problem, by Treatments

TABLE 17

Analysis of Variance on Concept Identification Problems for all Treatments

Source	df	MS	F
Between Subjects	19		
A (Treatments)	2	915.82	4.94*
Subjects within groups	17	185.40	
Within Subjects	40		
B Problems	2	5336.71	11.08**
AB	4	13.87	
B x subjects within groups	34	481.70	

$^{*}p < .05$

$^{**}p < .01$

on the test even though the items were substantially different from the items in the instructional program. Clearly lower class children may profit by having their attention called to the importance of function words such as and, or, and not. By providing practice in listening to rules or descriptions, these children show improvement in following instructions and understanding what is said.

It is possible of course that part of this improvement was attributable to the ability of children to deal with the specific pictorial features involved in this type of task. It may be desirable in subsequent studies to have a control group encounter the same types of attributes and pictures but without practice in applying the conceptual rules. These control children might be asked simply to identify pictures that correspond to a particular description, in other words, the control group here would be given practice with only the simple conceptual rule of affirmation.

Of special interest is the finding that the experimental groups perform so much better on the concept identification problems. On the first problem the advantage could be expected, since these children had already experienced joint denial as a type of rule. On the other hand, they had also been given other rules which could have offered interference in the new learning. However, on these new problems, where the rules were somewhat different from those encountered during instruction, the superiority of the instructed groups is evident. The finding appears to support the notion that in inductive concept learning an important part of the process is that of hypothesis testing. For this study, however, this explanation cannot be supported. Even though these instructed youngsters were able to identify the appropriate positive instances, none of them were able to verbalize the rule.

It is possible that the experimental groups had an advantage simply by being familiar with the pictorial boxes used as stimuli in the task. For greater experimental rigor in future studies, it would be desirable to give the Control groups experience with these types of materials.

The data did not support the major hypothesis of the study, providing no evidence that verbalization of the rule increased the child's competency in applying rules on the one hand or discovering rules in concept identification problems on the other. While the differences in general favored the Oral group, they were not reliable. With the few cases used in this study, there is a danger of making a Type II error. In the investigation reported in the next chapter, the same hypothesis was included among those tested. Here, however, a much larger population of subjects was used and the results can be accepted with greater confidence.

Chapter 7

THE ORAL RESPONSE IN THE ACQUISITION OF INFERENTIAL LISTENING SKILLS BY KINDERGARTEN CHILDREN[1]

The following experiment was designed to study the value of the oral response during a fairly long curriculum sequence. The study, including pre- and posttesting and administration of the lessons, covered a period of approximately 12 weeks. It was carried out under conditions which approached those of a typical classroom. For example, while maintaining fairly replicable conditions, the instruction was carried out with five or six children at a time, groupings which might be found in a typical kindergarten classroom.

Definition of Listening Skills Selected

In this investigation, attention was focussed on the importance of the spoken response in helping the child draw inferences after listening to a set of statements. The goal of the instruction was to improve the child's ability in certain listening skills, defined as follows:

(1) When presented with simple class inclusion or probability statements involving a verbal quantifier (i.e., all, some, or none), the child will respond to a question based on the statement by indicating which one of three possible answers is correct.

(2) When given a concept defining rule involving negation, conjunction, disjunction, or joint denial, the child will identify positive instances of the concept by selecting the appropriate picture.

In addition, the instructional program was designed to teach listening comprehension of certain concepts and principles in a nature study unit on undersea life.

Hypotheses

Three types of criterion measures were adopted for the study: (1) A Program Mastery Test over the content of a nature study unit (Listening Test of Specific Content); (2) Two Concept Application Tests (a Test of Listening Inference using the quantifiers all, some, or none, and a Rule Utilization Test applying conceptual rules); and (3) a Listening Skill Transfer Test (Following Directions and Using Information).

The following hypotheses were tested:

(1) Children given instruction in speaking aloud while learning to use orally-presented information will obtain higher scores on the

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[1] A version of this chapter was accepted on the program of the 1969 meeting of the American Educational Research Association to be presented as a paper entitiled, "Young Children's Use of Language in Inferential Behavior," by Carolyn Stern and Evan R. Keislar.

criterion measures than children given the same instruction without being required to speak aloud.

(2) Both of these instructed groups will be superior to a control group given the pre- and posttests but not the training program.

General Organization of the Study

The investigation was organized into three phases, each with its own criteria, in order to test different aspects of the hypotheses. In Phase 1, the first type of listening skill was taught. Children were given experience in drawing simple inferences from orally-presented information involving class inclusion and probability. In Phase 2 the emphasis was upon listening comprehension using concepts and principles in a nature study unit. Since the material was directly taught in the program, the criterion was a Program Mastery Test of Listening Comprehension over the content of the unit. In Phase 3 the instruction again focussed upon concept application. Children were taught to listen to a concept-defining rule and then to apply it to a series of positive and negative instances. Posttests were given at the end of each phase to assess the cumulative impact of the program.

Method

Subjects

The 124 subjects were selected at random from 10 kindergarten classes in a mid-city urban public school. Over 95 percent of the children were black. Five of the classes met in the morning and consisted entirely of first semester kindergartners; the five afternoon classes, taught by the same teachers as the morning sessions, contained second semester pupils. Over the three-month period of the study, 16 pupils were lost through attrition, thus complete data were available for a total of 108 children. The age ranged from 59 to 71 months, with a mean of 64 months. The mean mental age, based on the Peabody Picture Vocabulary Test, was 58 months, with a range of 31 to 96 months. There were a total of 53 children attending the first semester and 55 attending the second semester kindergarten classes. The sample consisted of 56 boys and 52 girls. These subjects were assigned at random to each of the three experimental groups: Oral, Non-oral, and Control. Table 18 presents data for sex, kindergarten level, chronological and mental age, by treatments. There were no reliable differences among the three groups on any of these variables.

General Instruction and Testing Procedures

All testing and instruction were carried out in a room, somewhat smaller than a regular classroom, in the building adjacent to the kindergarten rooms. The tests were individually administered to each child.

Within each treatment, the instruction was carried out in groups of five children. All the children in a group were escorted to the experimental room by an assistant. While that group was being instructed by the experimenter, the assistant escorted the previous group back to the classroom and returned with the next group of five children. In this way it was possible to schedule eight sessions during the morning and another eight during the afternoon, making 16 small groups with a total of 80 children.

The instructional procedures during the lesson were carried out, in so far as possible, in a replicable fashion. Most of the lessons were given in a modified programmed instruction format. However, whenever manipulanda was used, the procedures were more informal.

For the programmed lessons children were each given booklets with one frame per page. Commentary was usually provided by a tape recorder, with each child listening through his own earphones. (See Appendix 10 for sample frames.) In order to reduce distractions from other children, dividers were placed on the tables so that each child could see the research assistant but not the other pupils. Two views of the seating arrangements, with individual dividers between children, can be seen in Figure 11.

On some occasions, partly to provide variety but partly to offer modes of instruction more relevant to a particular task, children were given manipulanda with which to work. During Phase 1, for example, children worked with checkers, blocks, boxes, etc. On other occasions, one large stimulus was presented to all five children. For example, the unit on undersea life used a "porthole"(Figure 12) as a frame in which were displayed pictures illustrating the story; children indicated their answers by holding up individual response cards.

Phase 1

The objective of Phase 1 was to teach the child to respond appropriately when he heard the verbal quantifiers: all, some, and none, as well as the corresponding terms always, sometimes, and never. After the children listened to a single statement which included one of these quantifiers, they were required to demonstrate understanding by answering questions involving simple inferences based on the statement. The child's answer to such questions was one of three responses: yes, no, or can't tell. A major objective for this unit was to teach the child to withhold judgment.

Pretest

A pretest of 18 items was administered individually to each child in both experimental and control groups. Following a sample item, the child was given a six-item test of negation; i.e., he was required to identify three of six pictures which were not examples of the stated concent. E.g., "Mark all the pictures which do not show something good to eat." Another series of items assessed the child's ability to interpret a conditional statement. E.g., "If Mary sees a cat she is happy. Mary sees a cat. Is she happy?" The next six items dealt with verbal quantifiers. E.g., "All the clowns with striped suits have big noses. This clown has a striped suit. Does he have a big nose?"

On the negation subtest, children obtained an average score of 75 percent where 50 percent represents a chance score. On the test dealing with verbal quantifiers, the average score was at a chance level. (See Table 19.)

TABLE 18

Description of the Three Experimental Groups

Treatment Groups	N	Sex B	Sex G	Kindergarten Level 1	Kindergarten Level 2		CA in Months	MA in Months (PPVT)
Oral	38	19	19	19	19	Mean	64.3	55.1
						S.D.	3.6	13.5
Non-oral	36	20	16	17	19	Mean	64.7	60.2
						S.D.	3.8	14.1
Control	34	17	17	17	17	Mean	64.4	58.5
						S.D.	3.2	14.4

TABLE 19

Means and Standard Deviations of Groups for Three Listening Inference Pretests

Treatment Groups		Negation[a]	Conditional[b]	Class[c]	Total[d]
Oral	Mean	29.2	1.6	2.1	32.9
	S.D.	7.2	1.0	.9	7.5
Non-oral	Mean	31.3	1.9	2.2	35.4
	S.D.	7.5	1.3	.9	7.7
Control	Mean	30.5	1.6	2.4	34.4
	S.D.	8.2	1.1	1.0	8.3

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[a] Total possible score is 40; chance = 20.

[b] Total possible score is 3; chance = 1.

[c] Total possible score is 3; chance = 1.

[d] Total possible = 46; chance = 22.

Criterion Test

The major criterion for Phase 1 of the experiment was a test designed to measure the child's ability to draw inferences, given statements involving the words all, some, or none. These terms were extended to include corresponding statements with the words always, sometimes, or never. The Listening Inference Test is presented in Appendix 11. The 17 items in the test varied from simple picture identification to statements requiring drawing inferences with three dimensional materials. It was administered on an individual basis to each child in the experimental and control groups.

Two features of this test should be noted: (1) It was designed as an individual test. While this meant that fewer items could be included in the test, with concommittant loss in reliability, the fact that the test was an individual one increases the likelihood that all children, especially those in the control group, would perform at an optimal level. On group tests, children without experience in testing often receive low scores simply because the group instructions are difficult to follow. Thus the child may do poorly not because he lacks knowledge or ability but because he fails to understand the task. (2) The test is essentially a transfer test for the experimental groups. For example the items dealing with classes used cards which presented the same problems within a different context. To assess understanding of sometimes children were presented with spinners which were quite different from any instructional item encountered in the program.

The Instructional Program, for Phase 1

The instructional program for Phase 1 covered a period of approximately six weeks, divided into Phase 1A and Phase 1B. During Phase 1A, which involved two and one-half weeks, both experimental groups were taught to withhold judgment, i.e., to say, "Can't tell," when presented with insufficient information. The children were given a variety of problems where the correct answer was "Yes" or "No" or, where insufficient information was presented, "Can't tell."

As an example of the instruction given in Phase 1A, Lesson 6 is given in Appendix 12. All children responded in two ways: either by marking appropriate pictures or by saying aloud one of the three possible responses.

In Phase 1B, Oral and Non-oral treatment differences were introduced. Children in the Oral group were told to speak the key word or sentence for each item just before they made their selection of the picture. Children in the Non-oral group made the selection without speaking.

During the few sessions where programmed booklets were not used, the same distinction in the instructions was maintained. Members of the Oral group spoke out many times during each lesson, using the critical words as cues for answering the questions. In general, the children in the Non-oral group remained silent, although occasionally there was some spontaneous and unsolicited oral responding.

Children in both experimental groups were taught to deal with simple statements involving verbal quantifiers. The first items involved inferences of the following types:

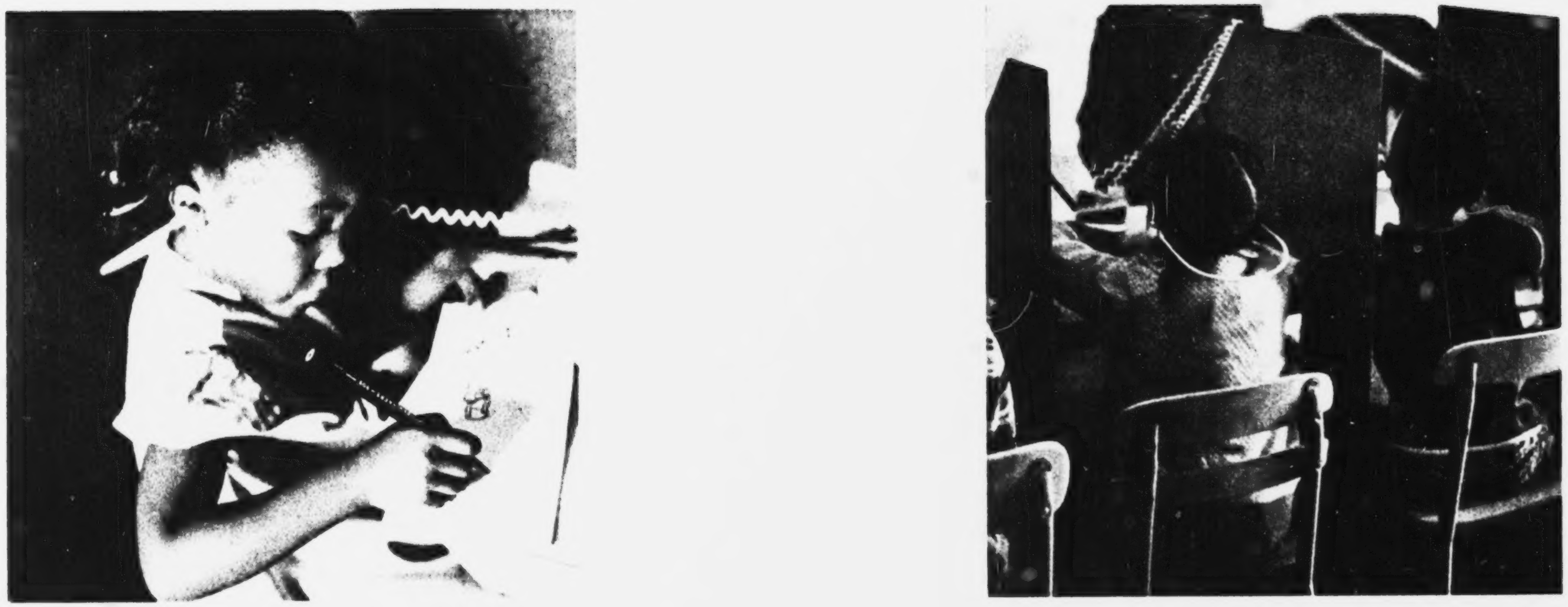

Figure 11. Two Views of Seating Arrangement with Individual Dividers.

Figure 12. Group Display with Individual Response Cards

All A's are B. Here is an A. Is it a B? (Answer: "Yes")
Some A's are B. Here is an A. Is it a B? (Answer: "Can't tell")
No A's are B. Here is an A. Is it a B? (Answer: "No")

The general sequence of the instruction was first to teach the child to describe situations by using the quantifiers appropriately. For example, the children described different bowls of fish by using the appropriate sentence: "All of the fish have stripes," "Some of the fish have stripes," or "None of the fish have stripes."

Children in the Oral group repeated the sentence before selecting the bowl described; the children in the Non-oral group heard the sentence and selected the appropriate picture. (Appendix 13 shows treatment comparison.)

The same type of task was taught with manipulanda. Children were shown a box in which there were only red checkers. The experimenter selected a checker from the box, without letting the children see what was removed, and asked "Do I have a red checker?" Children were reinforced for saying "Yes." Similarly, when the box contained only black checkers, children were reinforced for saying "No" when asked, "Do I have a red checker?" On other occasions, the box contained some black and some red checkers. Now when a checker was removed and the child was asked, "Do I have a red checker?," the correct answer was "Can't tell." To teach the behavior of withholding judgment, the problem was introduced with the question, "Can you tell for sure?"

Several games were included to supplement the programmed books. While these informal activities were not completely replicable, they produced a high level of motivation and participation.

Picture Box Game

To help in teaching an understanding of the probability terms, the "Picture Box Game" was introduced. Here the child was shown two boxes, one called the "cue" box and the other the "consequence" box. The front of the "cue" box had three back-lighted glass panels, each 8" x 10" in size, in front of which three pictures were displayed. The light behind each picture was controlled by the switch below that picture. The "consequence" box was one-third as large since it contained only one glass panel. The picture in this box was illuminated only when the button under the appropriate cue picture was pressed. Whether or not pressing the button for any of the three cue pictures would produce a light in the consequence picture was determined by the setting on the switch controlling that picture. The setting for any or all of these cue pictures could be such that the consequence picture would light up every time, some of the time (on a random schedule), or never.

The game proceeded as follows: Four pictures were first inserted behind the glass panels. For example, the three cue pictures might be an elephant, a dog, and a horse, while the consequence picture might be a clown. The children were told, "One of these animals always makes the clown laugh; one of them sometimes makes the clown laugh, and one of them never makes the clown laugh. Let's find which animal always makes the clown laugh."

Children would take turns pressing buttons and making predictions as to which animal would *always*, which one would *sometimes*, and which one would *never* make the clown laugh. The group always knew which button had been pressed because the light would go on in the cue picture. If a child selected the picture of the animal which always made the clown laugh, the clown lighted up every time. If he selected the one which never made the clown laugh the clown would not be lighted and an aversive buzzer sound was produced instead. For the third picture, sometimes the clown lighted and sometimes it did not. In the latter case, the aversive buzzer sounded. The game was played until every child had learned to turn on the appropriate light for any one of the three types of statements.

Since the pictures could easily be replaced, other kinds of Picture Box games could be played, with the control switch at the rear reset so that the child would not learn a position cue for all the games.

The advantage of this type of game was that the child learned to distinguish between *always* and *sometimes*, and *sometimes* and *never*. Where some doubt existed, a child could press one button repeatedly and find the correct relationship between that cue picture and the consequence, e.g., that the cue picture was indeed sometimes followed by the consequence and other times not. Getting repeated confirmations made the discrimination learning easier.

Path Game

A paper version of the Picture Box Game just described provided the children with a map showing a number of colored paths leading away from a starting point. In this Path Game, all of the paths marked by one color led to a specified goal, none of the paths of another color ended up at this goal, while only some of the paths of a third color reached the goal. By actually tracing the paths with their pencils the children could find out, respectively, which of the three colors "always," "sometimes," and "never" led to the goal. After the children had empirically determined these relationships, they were asked questions for which the appropriate response could be "Yes," "No," or "Can't tell." Compared to the Picture Box Game, in which one child responded while the other children watched, the Path Game provided the opportunity for all children to respond to each item. (See Appendix 14.)

Results for Phase 1.

Table 20 presents by treatments, the means and standard deviations on the criterion test, as well as the three subtests. The results of the analysis of covariance for subtests and total test are given in Table 21.

On the first subtest, (items 1 through 8) in which the child simply responded "Yes," "No," or "Can't tell," to questions based on information given, the Oral and Non-oral groups did fairly well; the means were 6.8 and 7.0, respectively, only a point less than the maximum. The Control group mean of 5.8, was significantly lower than that of the experimental groups.

TABLE 20

Means and Standard Deviations on Listening Inference Test for Three Groups

Group	N	Items 1-8		Item 9[b]		Item 10[b]		Item 11[b]		Total[c]	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Oral	38	6.8	.8	2.3	.6	2.6	.9	1.9	.6	13.7	1.9
Non-oral	36	7.0	.9	2.4	.6	2.6	.7	1.8	.7	13.9	2.0
Control	34	5.7	.9	1.4	.7	1.6	1.0	1.3	.7	10.0	1.9

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[a] Total possible score is 8 points.

[b] Total possible score is 3 points.

[c] Total possible score is 17 points.

TABLE 21

Analysis of Covariance for Listening Inference Test
for Three Groups with Pretest as Covariate

Source	df	Subtest 1		Subtest 2		Subtest 3		Subtest 4		Total	
		MS	F	MS	F	MS	F	MS	F	MS	F
Treatment	2	15.85	22.6**	11.4	31.4**	10.72	31.31**	4.06	9.22**	158.47	42.61**
MA	1	.89	1.2	.23	.61	2.43	3.02	.35	.78	2.03	.54
Interaction	2	2.23	3.2*	1.0	2.75	.04	.05	.45	1.03	4.06	1.09
Error	101	.7		.36		.81		.44		3.75	

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* $p < .05$

** $p < .01$

The second subtest (the three items in question 9) consisted of a problem similar to one which had been included in the program. Given oral and visual information about the colors on the sides of a cube on which all sides were blue, the children were asked to predict what color would appear on the top if it were thrown. They were also asked to make predictions for cubes which had some sides blue, or none of the sides blue. Since this type of item appeared in the instructional program, it is not surprising that the two experimental groups were significantly superior to the control. However, the Oral and Non-oral groups did not differ significantly.

In the third and fourth subtests (items 10 and 11) the problems were entirely new to the instructed groups and hence could be considered transfer items. As preliminary training for item 10, children were first shown a spinner, consisting of a cardboard pointer mounted in the center of a four-inch circle. The three segments of the circle were painted green, orange, and purple, respectively, and the child was shown how, by spinning the pointer, one could get different colors. Following this orientation, the child was shown three similar spinners, one with an entirely red circle, one with a circle half red and half yellow, and one with an entirely yellow circle. The child was asked on which spinner the pointer would sometimes get red, on which one it would always get red, and on which one it would never get red. On this item, both instructed groups received a mean of 2.6 which was significantly superior to the control mean of 1.6.

Item 11 tested the child's understanding of the verbal quantifiers, "all," "some," or "none." The child was shown a set of cards on each of which there was a picture of either a clown or some other object. After all the pictures were displayed, the cards were turned over so the child could see that the backs of some of these cards were pink, some green, and some orange. He was told, "All the pink cards have clowns on them. Does this pink card have a clown on the other side?" Then he was told, "None of the green cards have clowns on them. Does this green card have a clown on the other side?" "Some of the orange cards have clowns on them. Does this orange card have a clown on the other side?" On this posttest problem the instructed groups achieved scores of 1.9 and 1.8, while the control group received 1.3. The difference between instructed and control groups was significant at the .01 level.

Although the problems were designed with a high level of difficulty so as to permit differences between the two experimental groups to emerge, the Oral group did not score reliably higher than the Non-oral on any of the subtests nor on the total test. While the two experimental groups did not approach the maximum score on this difficult test, they were clearly superior to the uninstructed control.

Phase 2

The Teaching of Specific Concepts in Nature Study

The major function for Phase 2 was to test the hypothesis regarding the value of oral instruction in teaching highly specific subject matter content. The concepts taught were related to undersea animals and included specific information which would help both to identify the animal from among three alternatives and to answer simple "yes-no" questions about them. Since for each Phase the children remained in the same treatment group, the results of this part of the study reflect a cumulative build-up of the effect of the oral response. The Control group was not given this instruction and thus could not be expected to answer specific questions over the program content. Therefore, the Control group was not given any of the tests for Phase 2.

Hypothesis

The specific hypothesis of this part of the study was that the children in the Oral responding group who say aloud the concept labels in a nature study program, in comparison with those who respond only "Yes" or "No," will perform better on an identification test consisting solely of selection items, and where oral responses are not required.

Experimental Plan

The total time for Phase 2 was approximately two and one-half weeks. All children in the Oral and Non-oral groups, approximately 80 in number, were given an individual pretest followed by slightly more than a week of instruction, and then an individual posttest.

Instructional Program

The instructional material was presented in a varied program, including: (1) Booklets in which children followed a sequence of frames as they listened to tape recorded commentary. (See Appendix 15.) (2) Dramatic presentations in which pictures were presented through a simulated porthole while the children listened to taped commentary and answered questions by holding up stick-cards containing pictures of the different animals or parts of animals included in the lesson.

In this instructional program, the children were taught about five undersea animals: the octopus, seahorse, crab, scallop, and coral. The children learned where these animals lived, what they ate, how they moved about, and how they protected themselves. The examples of the kind of concepts and principles they learned will be found in the posttest Appendix16.The distinction between the oral and non-oral program is exemplified in Appendix15 which presents a typical lesson for each of these treatments.

Results for Phase 2

In Table 22 are presented the means and standard deviations for the pre- and posttests for the Oral and Non-oral groups. It will be noted that on each part of the posttest, as well as on the total, the Oral group obtained higher mean scores than the Non-oral. While these differences are not significant for the first part of the posttest (see Table 23 for Analysis of Covariance) on the second part and on the total posttest, the Oral group is reliably superior to the Non-oral group. Parenthetically, it may be noted that the main effects of mental age are significant only for the first part of the posttest. These findings indicate that, with this population, acquisition of specific content was facilitated by oral responding.

TABLE 22

Means and Standard Deviations on Pre- and Posttest for Nature Study Unit

		Pretest		Posttest[a]					
				Subtest 1		Subtest 2		Total	
	N	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Oral	37	4.8	1.7	8.7	1.7	2.7	0.6	11.5	1.8
Non-Oral	34	5.2	1.3	8.3	2.0	2.3	1.1	10.6	2.6

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[a] Total score possible is 16

TABLE 23

Analyses of Covariance for Test on Nature Study Unit
Two Treatment Groups with Pretest as Covariate

Source	df	Subtest 1		Subtest 2		Total	
		MS	F	MS	F	MS	F
Treatment	1	11.01	3.83	4.27	5.89*	31.46	7.76*
MA	1	11.77	4.09*	.34	.46	13.80	3.40
Interaction	1	.80	.28	.28	.37	.00	.00
Error	66	2.87		.72		4.05	

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*p <.05

**p <.01

Phase 3

The final two weeks of the study included a program designed to teach children to listen to and apply conceptual rules. From another point of view, the children were taught to respond appropriately to three little, but important, words: and, or, and not. In Phase 3, therefore, the problem was practically identical with that reported in Chapter 6. Criterion tests were given to the control, as well as to both instructed, groups. In addition, a general test of transfer for listening comprehension was given to the Oral and Non-oral groups.

The Task

As in Chapter 6, the task was one of deductive learning. Children were given a rule in the form of a simple one or two sentence story, and then expected to apply it on three of four successive items. The task was phrased in terms of finding a missing item meeting certain specifications, according to one of four conceptual rules: conjunction, disjunction, joint denial, and exclusion (x and not y). The latter rule was substituted for that of negation in this study because these children had had a good deal of prior instruction with negation in Phase 1.

Children were shown a set of three to four frames, each of which presented three picture choices. Of these three, one was a positive instance, and the other two were negative instances, of the concept. In order to maintain interest, on the last item of the set the experimenter told the child that he had found the missing object for that problem.(See Appendix 17 for sample items.)

Instructional Program on Rule Application

The instructional program was similar to the one described in Chapter 6, with three important differences: 1) Most of the negation items were not repeated since this rule had already been taught in Phase 1. 2) Children in the Oral group were taught to say aloud a few key words as a cue to help them remember the rule before responding to each item. 3) Unlike the previous study in which, during instruction, the attributes were represented by separate objects, in this study the pictures were drawn specifically so as to embed the critical attributes in the total visual stimulus. Thus the materials used during this program were more like the items in the posttest.

Criterion Tests

Three tests were administered at the conclusion of Phase 3. The first, the Rule Application Test (see Appendix 18), designed to assess the effectiveness of the instruction, consisted of five problems, each requiring the application of a rule to a series of instances. The first problem contained three items and the others four items apiece. As indicated earlier, each problem was couched in a story framework involving the search for a missing person or object whose description, constituting the rule, was explicitly given to the child. Each of the four conceptual rules was used for at least one problem; the conceptual rule of exclusion was used for two problems. The score for the test was simply the number of items which the child was able to answer correctly out of a maximum possible score of 19. In addition to the total score for all five problems, the data for each of the problems were analyzed separately.

The second and third tests (see Appendix 19) administered at the conclusion of Phase 3 were designed to compare the cumulative effect, over all phases of the study, of the oral treatment versus the non-oral treatment in fostering broad listening skills. The first of these measured the ability to process information. For each item, the appropriate response to the final question was "Yes," "No" or "Can't tell." After the three orientation items, the child was given a statement of the problem, e.g. "I'm going to tell you about Johnny. Listen and see if Johnny has a baby sister." On some of the problems, the sentences which followed provided the answer to the question posed; on other problems the relevant information was never supplied. The child was then asked to give the answer to the problem, "Does Johnny have a baby sister?" The total possible score for this test was 13 points.

The third test assessed ability to follow directions by marking a set of pictures according to specific instructions, e.g. "If it is Not food, draw a line through it." On some items these instructions involved complex statements, e.g. "If it is food, draw a circle around it and if it is an animal draw a line through it." The first item contained six pictures; the remaining four items had 18 pictures apiece. On this test, the total score possible was 60 points.

Results for Phase 3

The results of the Rule Application Test for each of the three treatment groups are presented in Table 24. Here it may be noted that while the differences between the Oral and Non-oral groups are fairly small, both these instructed groups performed somewhat better than the Control on every problem. The significance of the differences for problems and total test were obtained by 2 x 3 analyses of variance, using two levels of mental age and three treatment groups (see Table 25). As the data indicate, the differences among the three groups are reliable not only on the total score, but they are reliable for each problem except problem 5.

The differences between the individual pairs of means, using the Neuman Keuls Test, are shown in Table 26. It will be noted here that both of the experimental groups are significantly superior to the Control of the Total Test: The Oral group is significantly superior to the Control on problems 1, 2, 3, and 4, while the Non-oral group is reliably better than the Control on problems 1, 2, and 4. The only significant difference between the Oral and Non-oral groups is for problem 2, where the Oral was higher.

The main effect for mental age is significant for the Total Test, as well as for each of the five problems, but no interactions were found to be significant.

The listening tests produced unanticipated results with reference to

TABLE 24

Means and Standard Deviations on Rule Application Test for Three Groups

Group	N	Item 1 maximum 4		Item 2 maximum 3		Item 3 maximum 3		Item 4 maximum 3		Item 5 maximum 3		Total	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1 Oral	36	1.9	1.1	3.0	1.3	2.5	1.1	2.3	1.4	2.2	1.1	12.0	3.9
2 Non-oral	36	1.6	1.1	2.4	1.4	2.2	1.2	2.6	1.2	2.2	1.0	11.0	4.0
3 Control	32	1.1	.9	1.8	1.2	1.8	1.0	1.8	1.1	1.8	1.0	8.3	2.9

TABLE 25

Analyses of Variance for Rule Application Test for Three Groups

Source	df	Subtest 1 MS	 F	Subtest 2 MS	 F	Subtest 3 MS	 F	Subtest 4 MS	 F	Subtest 5 MS	 F	Rule T MS	 F
Treatment	2	7.28	7.63**	12.56	7.40**	4.95	4.01*	5.83	4.11*	2.22	2.34	138.22	12.02**
MA	1	5.07	5.31*	11.18	6.59*	5.23	4.23*	10.98	7.74*	9.54	10.05**	207.20	18.02**
Interaction	2	2.66	2.79	.52	.31	.19	.15	4.36	3.07	.10	.11	13.65	1.18
Error	98	.95		1.69		1.23		1.41		.94		11.49	

---

*$p < .05$

**$p < .01$

TABLE 26

Results of Neuman Keuls Paired Comparisons on Rule Application Test

Comparison on	Difference between Oral and Control	 Non-oral and Control	 Oral and Non-oral
Problem 1	.8*	.5*	.3
Problem 2	1.2*	.6*	.6*
Problem 3	.7*	.4	.3
Problem 4	.6	.8*	.3
Problem 5	.4	.4	0.0
Total Test	3.7*	2.7*	1.0

---

*Difference is significant at the .05 level the major hypothesis. The Non-oral group, contrary to expectations, showed higher mean scores on both these tests than the Oral group. The results given in Table 27 show that the Non-oral group scored several points above the Oral on each of these broad transfer measures. (As indicated earlier, the Control was not given this test.) To test the significance of these differences, a 2 x 2 analysis of variance, two treatments with two mental age levels, was carried out. The results of these analyses, presented on Table 28, show that the Non-oral group was reliably superior on the first listening test, Using Information. On the second test, Following Directions, although still favoring the Non-oral group, the differences were not reliable. This is the only instance in the present series of studies, in which a Non-oral group was superior to the Oral.

Discussion and Conclusions

Summarizing the results of the three phases of this experiment, some conclusions with respect to the major hypotheses may be formulated.

I. Oral versus Non-oral Instruction.

The effect of instructing young children to say aloud critical words instead of only listening and responding to multiple choice questions is clearly evident with the specific content of the nature study unit. The Oral group was significantly superior to the Non-oral on the total test of concepts and principles covering the life of undersea animals. This was true even when the criterion test did not require children to verbalize at all; each of the test items required only an identification response.

The differences between the Oral and Non-oral groups were generally unreliable when the task involved the use of quantifiers, negation, or sentential connectives. On these tasks, out of about a dozen comparisons only one (a problem on the Rule Application Test) showed a reliable difference in favor of the Oral group. On all of the remaining problems, the differences, although not reliable, favored the Oral group, except in one case where there was an unreliable difference in favor of the Non-oral group. No evidence was obtained to support the major hypothesis.

On the more general listening test, where the task involved skills quite different from those developed in the program, the results were unexpected: the means of the Non-oral group were higher than those of the Oral. While the superiority of the Non-oral group was not reliable on the Following Directions test, it was clearly significant on the test of Using Information. It would appear that the children in the Oral group may have learned verbalizing habits which interfered with their performance on a listening task different from the one taught during training.

II. Instructed versus Control Groups.

When the performance of the two experimental groups is compared with the Control the value of instruction of these tasks is supported on almost every comparison. Such a clear cut superiority of the instructed groups deserves further scrutiny.

TABLE 27

Means and Standard Deviations on Listening Transfer Tests for Two Instructed Groups

Group	N	Using Information		Following Directions	
		Mean	S.D.	Mean	S.D.
Oral	38	4.9	2.7	46.3	17.8
Non-oral	36	6.5	2.7	49.6	16.6

TABLE 28

Analyses of Variance for Listening Transfer Tests

Source	df	Using Information MS	Using Information F	Following Directions MS	Following Directions F
Treatment	1	25.29	4.18*	18.87	.07
MA	1	90.87	15.04**	2550.06	9.58*
Interaction	1	6.60	1.09	151.31	.56
Error	70	6.03		266.15	

---

*p $<$.05

*p $<$.01

It might be argued that these obtained differences merely indicate that the Control subjects lacked an understanding of the task, rather than an ability to perform. For many of the criterion tests this possibility can be safely ruled out. For example, the Listening Inference Test requires the child to respond appropriately to the terms always, sometimes and never. After being given an introducation to the way the spinners worked, the child was asked to select, in turn, the spinner which would sometimes, always, or never point to red. These materials were as new to the two instructed groups as to the Control. For the Rule Application Test, the problems were posed in a lifelike form asking the child questions which were not unrelated to the child's everyday life. Children were, for example, asked, "Which of these sweaters could be Jimmy's?" a type of question which they had undoubtedly faced many times. For a large number of the test items, therefore, there seems to be little support for any contention that the control group was penalized for lack of familiarity with the task.

However, the use of the response alternative, "Can't tell" as a way of expressing the withholding of judgment raises some questions. Did the control children really understand what was expected of them here? Did they understand, for example, that they were not supposed to guess? This test was preceded by a rather lengthy instructional program which was intended to teach the youngsters that on this test guessing would not be rewarded. How extensive should such orientation be? If made too extensive it could almost be considered instruction. The orientation attempted to provide a reasonable compromise.

When evaluating the results of an instructional program an important question is: "How much class time is it worth expending for the results obtained?" The total time taken for instructing children in the task of responding to statements involving verbal quantifiers was four or five hours, which does not seem excessive. Where more time is available other tasks could be added to enhance the effectiveness of this instruction. For example, the approach adopted in the present study was one which taught children to withhold judgment. An alternative procedure would ask the child to respond "Maybe" to indicate whether or not a particular outcome is possible (Cf., Ennis, 1965).

In any event, this study has demonstrated the potential value of instructing children to understand, i.e. to respond appropriately to, certain linguistic forms involved in the communication of relationships.

Chapter 8

CONCLUSIONS

In reviewing the course of the project, several major contributions can be enumerated: (1) Data about the nature of language differences between lower class and middle class kindergarten children; (2) Evidence regarding the value of the instructional procedure of overt verbalization for the development of listening skills in the kindergarten; (3) Information concerning the feasibility of kindergarten curricula directed toward (a) ability to apply conceptual rules, (b) withholding of judgment where information is insufficient, and (c) understanding the meaning of verbal quantifiers and their corresponding probability terms; and (4) Development and evaluation of replicable instructional programs with this population.

Language Deficiency of Lower Class Children

Evidence was collected to support Bernstein's position that lower class children use a restricted language code. This is especially true with regard to function words where refinements and subtle discriminations are made. On an immediate memory test, lower class children averaged below middle class children on all three word classes, however, their deficiency, relative to middle class children, is significantly greater in recall of function words than of nouns or verbs. It seems that disadvantaged children have not learned to respond adequately to function words or to use them in their own speech.

Additional support for the restricted character of the language of these children was found in the second investigation, where disadvantaged children performed more poorly than middle class children on questions and declarative statements. However, they had relatively less trouble than the middle class children with sentence fragments which included the key words. This suggests that these young lower class children have had less experience in responding to complete interrogations, and are relatively less handicapped when the key words are isolated for them. The sentence form in which a problem was posed was a confounding variable and may have masked the differences between socioeconomic classes on the use of conceptual rules.

The Value of the Oral Response

The cumulative evidence from the sequence of investigations described in this report indicates that instructions to verbalize, and subsequent overt responding, has measurable value where there is a direct correspondence between the stimulus and the verbal response. The reading study confirms an earlier finding that verbalization in the presence of the printed word facilitates learning. A possible interpretation is that words which are overtly verbalized are more apt to operate as cues in a subsequent silent reading task. This was true even though the criterion did not involve the production of the overt speaking response but rather the identification of the appropriate picture or word.

The finding that the oral response was helpful in learning concepts drawn from the nature study unit may require a different interpretation. Here the children were working with relatively unfamiliar labels. Following Underwood's two-stage model of paired-associate learning, the child may be increasing response availability by rehearsing the new response. Active rehearsal of these words may have made them more useful as mediators for the subsequent task. Whether dealing with such unfamiliar words, or the familiar ones of the reading study, the act of speaking a distinct and critical response strengthened a highly discriminative cue which could be used in the subsequent task. The behavior involved during instruction may well have been fairly analogous to the covert behavior in answering questions on the criterion test.

The results of both the reading and the nature study units suggest another interpretation. Having the child speak aloud may lead to greater attention on his part to the critical features of the visual or auditory stimulus; the response may not act in any essential way to produce a cue for his subsequent behavior. It should be noted, however, that the non-oral groups were not passive; even though they were not speaking, they were required to respond continuously by making multiple choice selections in answer to the same series of questions. Still, for the oral group, speaking aloud may well have called attention to more of the key aspects of the stimulus than merely selecting the correct answer.

The effect of speaking aloud was much less clear in the investigations in which function words were used. These words (the verbal quantifiers, all, some, and none, negation, and the sentential connectives, and, or) were embedded in varied sentence contexts. Negative results were found when the verbal quantifier the child was required to say aloud was only part of a total sentence. The results did not support the expectation that children would profit by saying aloud the key phrases in rules involving negation and sentential connectives.

However, it should be noted that the materials used here differed from those in the reading study or the nature study unit where a clearer cueing function of the words is apparent. Furthermore, both the work of Kendler and Silverman, cited in the first chapter, show that verbalization was effective under conditions where the material was simple; the reversal shift learning was enhanced by verbalization because the child was only required to give a single key word embedded in a stock phrase (e.g., "black's the winner"). In the present investigations, however, the verbalizations were never so algorithmic in character since the child was taught to express his responses in many ways. The instructional materials sampled a wide variety of content and sentence construction and thus did not permit the child to acquire, at least under the instructional conditions provided, a clear cut verbal mechanism for self cueing.

It is still important to note that, while overall reliable differences were not obtained with the verbalization of function words, on all test and subtest comparisons, the means favored the oral group, in one case reliably so. Greater understanding of the mechanisms involved may be obtained if the variety of linguistic expressions were more carefully analyzed and systematic provision made for appropriate practice with each form. In addition to providing a clearer picture of the conditions in which overt responding is most facilitating, such an analysis would make an important contribution to curriculum construction. A more careful task analysis and better programming may have shown a significant superiority for the oral group.

In the study reported in Chapter 4, it was demonstrated that interference occurs where the verbal responses produced do not contribute to the performance of the given task. Probably speaking aloud produces either facilitation or interference, depending upon the functional value of the words verbalized. Merely having children speak aloud may serve to maintain superficial involvement without producing the desired learning outcomes.

In the final experiment there was some concern that requiring overt speaking over a period of many weeks might result in mechanical, robot-like responding which could interfere with other learning. Although this negative effect was not present where the tests were highly similar to the tasks presented during instruction, where the processes differed considerably from those of instruction, as in the general listening test, there was clear evidence of interference as a result of oral response training. It was almost as if the verbal procedures acquired by the oral group confused rather than aided the children when the tasks involved more general kinds of listening skills. To avoid the possibly interfering effects of overt verbalization, it might be of value to provide a greater amount and variety of practice during instruction so that discriminations can be formed, and material can be overlearned.

Curricula for Young Children

The main focus of the entire investigation was upon developing methods for improving the child's listening comprehension in critical areas, especially his use of important function words. In planning the curriculum to test the oral hypothesis, therefore, it was necessary to simultaneously study the feasibility of instructing these children in three new types of competencies.

At the outset it should be recognized that the primary goal of the investigation was not to produce the most effective instructional program, i.e., one which would result in near perfect scores on the criterion test. Instead, in order to obtain a viable discrimination between the treatments, it was necessary to develop a program of moderate difficulty; a very effective program might have masked any differential effects of speaking or not speaking.

There were three different areas in which new content was explored. In the first, data was obtained demonstrating the potential value of instructing young children to respond more appropriately to the critical cues for the conceptual rules. Distinct progress in applying concept-defining rules was found not only in a pilot study involving a dozen chilren (reported in Chapter 6) but also in the more expanded study with over a hundred subjects where such instruction was the culmination of a curriculum unit almost three months in length. The total instructional time, between one and two hours, spent on rule application appears to be justified by the results. Of interest is the fact that, in the pilot study, at least for the oral group, the learning generalized to items which were somewhat different from those in the rule application program. Furthermore, the instructed groups clearly transferred their learning to concept identification problems where the task involved inducing the rule, not merely applying it.

The conceptual rules in this project were applied to fairly mundane, everyday experiences of the child. It is likely that these concepts are most appropriate because the attributes are well known. The child's attention can, therefore, focus on the conceptual rule itself. It should also be recognized that a single "slice" of language instruction focused around a few critical words can hardly hope to show much impact on those broad language abilities which are called for in a typical classroom setting. Where an accumulation of such segments are provided in the curriculum, it could have an important effect on the child's learning of regular academic content. Such training might be effectively extended into other areas where the concepts are more closely related to academic pursuits.

These findings support the value of rule application training in improving the child's abilities, not only to understand the teacher's verbal descriptions of concepts but also to discover new concepts on his own. This would be especially valuable for children who come from homes where enriched language is not present and much of language learning is left to chance.

A second important outcome (reported in Chapter 7) was evidence that young children could be taught to withhold judgment where a definitive "yes" or "no" answer is inappropriate. At all levels of education, even among adults, individuals are prone to think in dichotomous terms, i.e., they assume that either a positive or negative response must be correct. This limited approach precludes the possibility of asking additional questions to explore the problem further.

Unfortunately, teachers of young children unwittingly foster such an attitude when, to avoid ambiguity, they pose questions to which either "yes" or "no" is always the correct answer. Thus the child not only has no experience in dealing with indeterminacy, but half the time, by pure chance, is reinforced for guessing. The child, from the moment he enters the school environment, should be taught to deal with situations which because information is inadequate, require withholding a decision and seeking further evidence. Introducing this kind of training at an early age should contribute to the cultivation of inquiry processes.

It would be a severe limitation if the instruction in withholding judgment were to be so effective that the child failed to recognize situations where guessing is desirable or even necessary. In many life situations it is better to make a decisive act than to wallow in indecision. For example, in objective-type examinations, it is often desirable to make as "educated" a guess as possible. Also in many situations such as in the game of "Twenty Questions" a tentative guess is the only way in which additional information can be obtained. Withholding of judgment should not be permitted to interfere with the process of hypothesis formulation and testing.

The ability to withhold judgment involves the recognition of possibility; the child must learn that where more than one eventuality is possible, a decision must be postponed. In such cases saying "maybe" may be a better alternative than withholding of judgment. The program should be expanded to include this addition to the child's repertoire.

A third area of curriculum development involved the use of verbal quantifiers _all_, _some_, and _none_. The goal was a limited one: to have the child understand, i.e., to acquire a listening comprehension of, these terms. The child was _not_ asked to draw inferences from the premises in which these quantifiers appeared; his task was simply to demonstrate understanding by responding appropriately when the sentences in which the quantifiers were involved were restated. Paralleling this instruction was the introduction of the child to the probability words _always_, _sometimes_, and _never_. A lack of understanding of these important terms may contribute to the apparent deficiency in certain listening skills and the inability to follow instructions which characterize the school behavior of these young children. The significant improvements resulting from this brief program suggest that this type of instruction would be appropriate for many kindergarten children.

Development of Instructional Programs

A major objective of the project was to carry out experimental treatments with instructional programs which would be highly replicable and thus permit exportation into classroom settings. Over the several studies in this project, it was demonstrated that it was possible to maintain experimental rigor for an extensive period of time through the use of these programmed materials. An adequate degree of control was provided through the use of individual earphones and dividers. Small groups of children were effectively taught listening skills through these lessons, using picture books with color feedback and taped commentary. The use of games involving manipulanda seemed to be quite effective in improving the child's understanding of many words such as those conveying the concept of possibility. With some adaptation, the techniques as well as the content of the experimental treatments are suitable for use in a regular curriculum.

The criterion measures developed as research instruments to test the hypotheses of the project served also to provide simultaneous evaluation of the effectivenesss of the programs. These assessments provide valuable information on which to base decisions about the instructional program for the kindergarten. As instruments for the assessment of language competencies, these tests may have independent merit. Although they have not yet been standardized, several of them seem worthy of further revision and extension as test instruments for wider use.

While the programs were adequate for the purposes of the project, they were not by any means the most effective ones possible. With appropriate changes, it is likely that they could be sufficiently improved to warrant their inclusion within the typical classroom. In fact, a revised version of this program is now being incorporated into a two year curriculum in a parallel project with a similar population. Thus, the research findings of this project are likely to be the basis for other innovative applications.

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APPENDIX 1

LISTENING TEST ON FOLLOWING INSTRUCTIONS WITH SENTENTIAL CONNECTIVES AND SENTENCE FORMAT

This test was given to the child by showing him a card on which pictures had been drawn. He was given oral instructions and was also asked to point to the box in which the right picture appeared. There were five parts to the test, one part for each of the following conceptual rules: affirmation, negation, conjunction, disjunction, and joint denial. Each part of the test was prepared in four forms varying only in the way in which the specific instruction was presented for the test items proper. In Form A a phrase was used containing only the key words needed to identify the right box, in Form B a declarative sentence was used, in Form C the interrogative was presented, and in Form D the imperative was given. Each child was given items for all conceptual rules and for all sentence formats but only received one form for any given item. In the following two pages the first part of the test is presented. At the left will be found the descriptions of the pictures on the cards and on the right side of the page is the commentary read to the child. The word describing the correct picture is underlined.

APPENDIX 1

LISTENING TEST ON FOLLOWING INSTRUCTIONS

WITH SENTENTIAL CONNECTIVES AND SENTENCE FORMAT

Part 1. Conceptual Rule: Affirmation

FORMAT FOR INSTRUCTIONAL ITEMS				
Item No.	Pictorial Stimuli			COMMENTARY
	TEST			"Point to the box each time."
1	car	spoon	banana	Form A. "a car" Form B. "In the right box, there's a car." Form C. "Which box has a car?" Form D. "Find a car?"
		Gingerbread Man		"Little Gingerbread Man carried home his package. One box shows what he brought."
2	horse	monkey	apple	Form A. "An apple" Form B. "In the right box, there's an apple." Form C. "Which box has an apple?" Form D. "Find an apple."
3	doll	plane	flower	Form A. "a flower" Form B. "In the right box, there's a ball." Form C. "Which box has a flower?" Form D. "Find a flower."
4	apple	ball	truck	Form A. "a ball" Form B. "In the right box, there's a ball." Form C. "Which box has a ball?" Form D. "Find a ball."

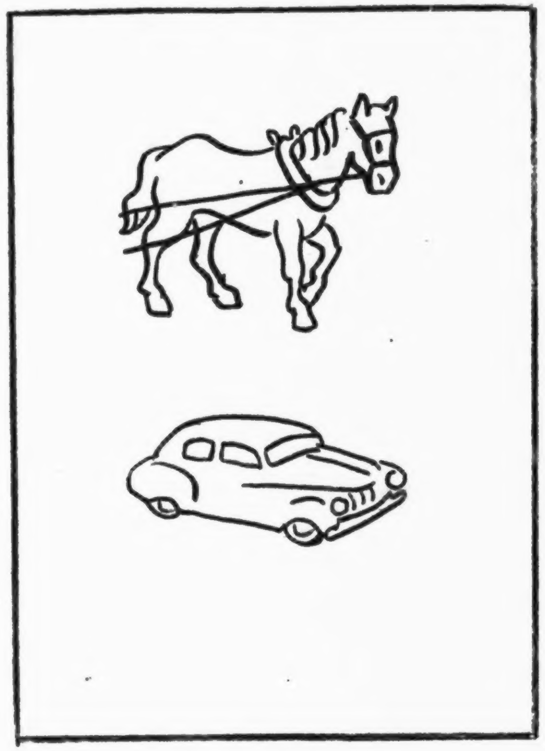
APPENDIX 1

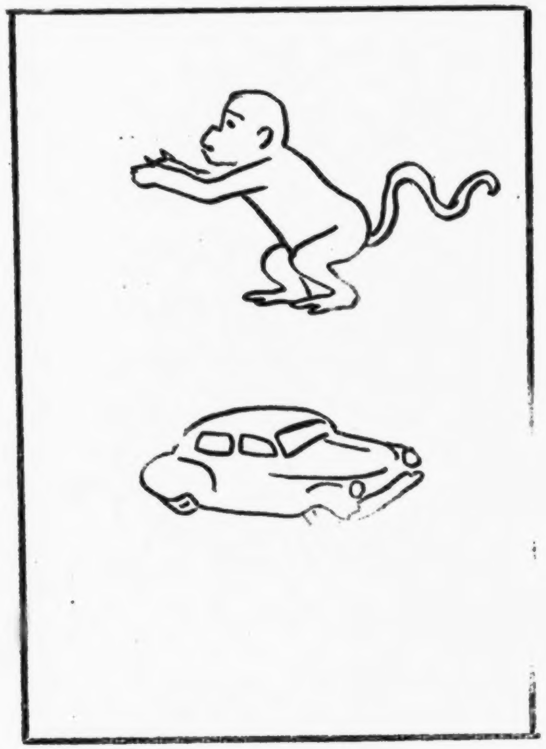
LISTENING TEST ON FOLLOWING INSTRUCTIONS WITH SENTENTIAL CONNECTIVES AND SENTENCE FORMAT

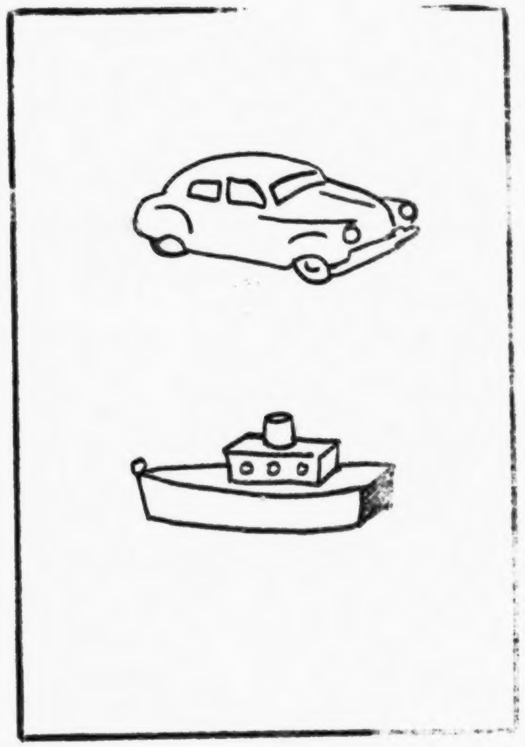
INTRODUCTION

FORMAT FOR INSTRUCTIONAL ITEMS

Item No.	Pictorial Stimuli			COMMENTARY
a		box		"I have some delightful stories and pictures for you today. I'm going to tell you all about them . . . . . This is a box."
b		boy		"When I tell you about a picture, you look; don't hurry. Wait until I'm finished telling you all about the picture . . . . . This box has a picture in it. Point to the box that has a boy.
c		girl		"There's a girl in the box. Point to it."
d	clown		box	"Point to the clown in the box."
e	Indian		cowboy	"Point to the cowboy in the box . . . . . Now point to the Indian in the box."
f	girl jumping rope	boy washing hands	boy climb- over rail	"Point to the box where a boy is washing his hands . . . . . Point to the box that has a girl jumping rope."







A. "Car and monkey"

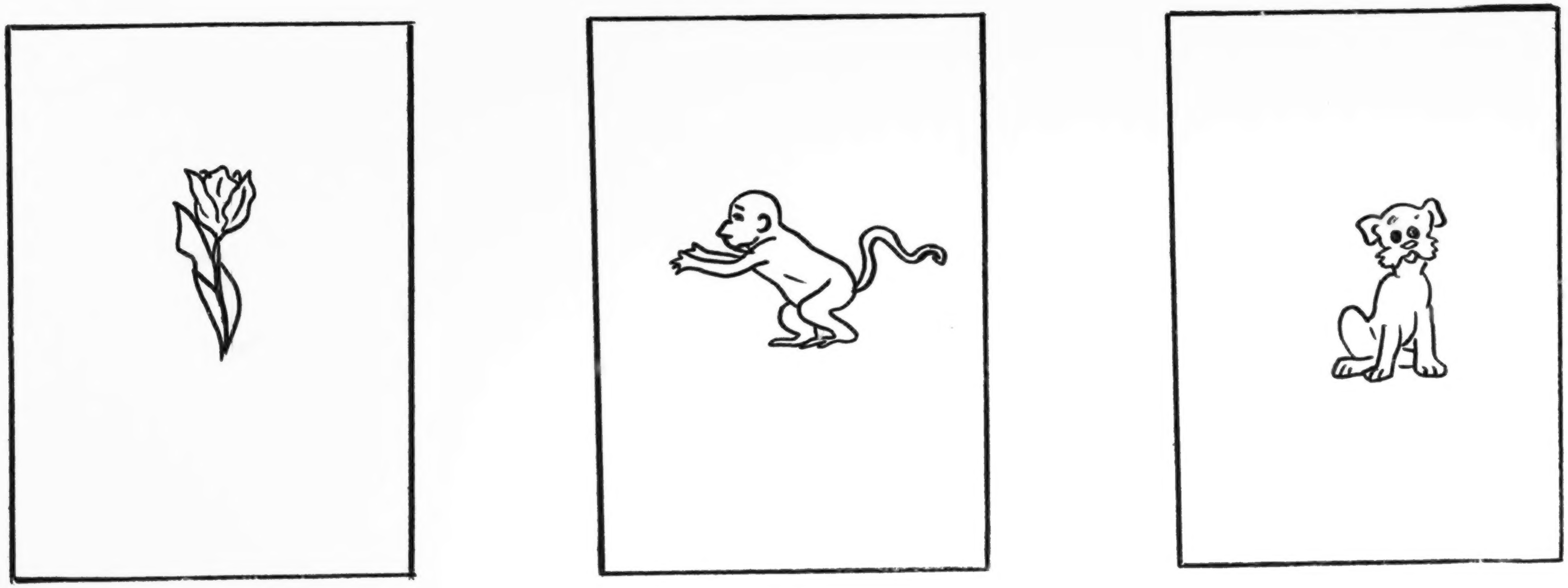
B. "In the right box there's a car and monkey."

C. "Which box has a car and monkey?"

D. "Find a car and monkey."

APPENDIX 2

SAMPLE ITEM FOR CONJUNCTION



A. "Dog or spoon"

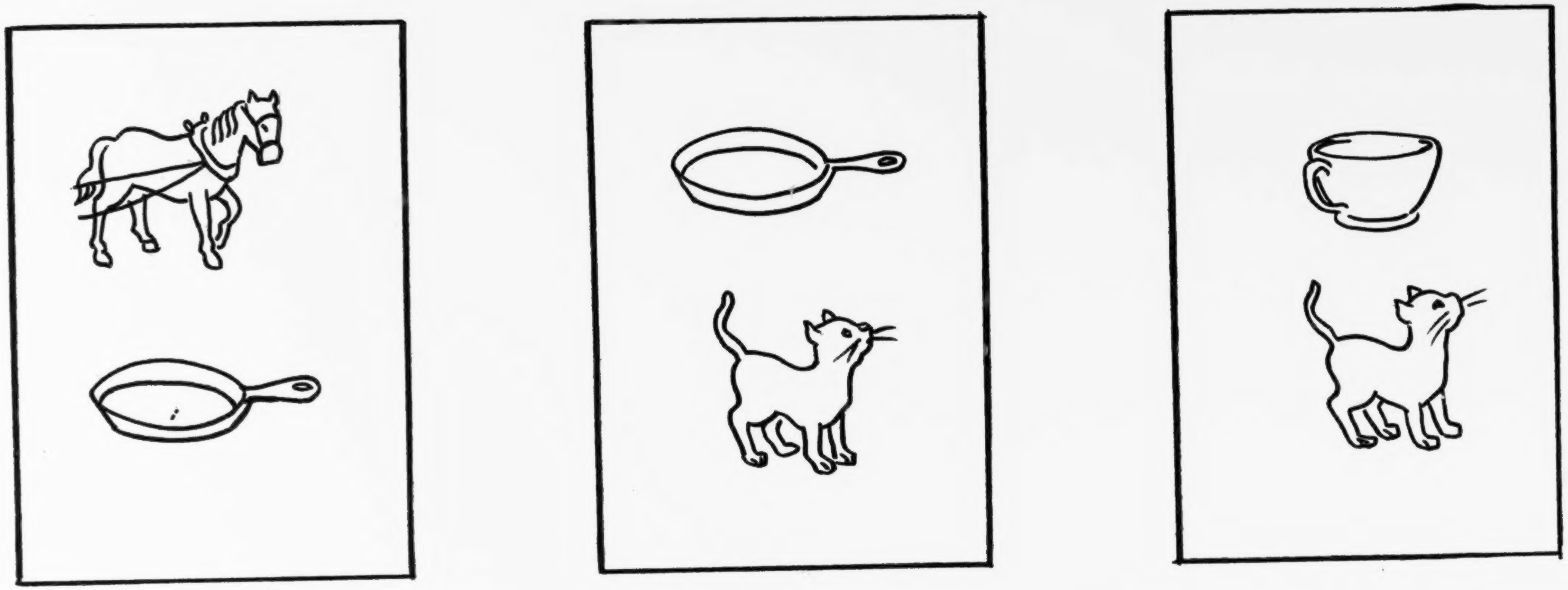
B. "In the right box there's a dog or spoon."

C. "Which box has a dog or spoon?"

D. "Find a dog or spoon."

APPENDIX 2

SAMPLE ITEM FOR DISJUNCTION



A. "Neither a cat nor a cup"

B. "In the right box there's neither a cat nor a cup."

C. "Which box has neither a cat nor a cup?"

D. "Find neither a cat nor a cup."

APPENDIX 2

SAMPLE ITEM FOR JOINT DENIAL

APPENDIX 3

SELECTIVE LEARNING TASK ON A SIZE DIMENSION

Commentary for Each Day of the Program: (Day 1 & 2)

Treatment A-L: Attribute Labeling

Problem 1

a. Look at the arrow. The arrow points to the right picture. Remember which picture is right. It will be right next time too! Its name is Medium. Say Medium. Now point to it.

b. Find the same one. Say Medium. Point to the same picture.

c. Find the same one. Say Medium. Point to it.

d. Same one this time. Say its name and point.

Problem 2

a. The arrow points to the right picture. It will be right next time too! Its name is Big. Say Big. Now point to it.

b. Find the same one. Say Big. Point to the same picture.

c. Find the same one. Say Big. Point to it.

d. Same one. Say its name and point. Let's do another!

Problem 3

a. The arrow points to the right picture. Its name is Medium. Say Medium and point to it.

b. Find the same one. Say Medium and point to it.

c. Same one. Say its name and point.

d. Same one. Say its name and point.

APPENDIX 3

(Instructions for Problem 3 are repeated for Problems 4-30, naming appropriate label.)

Treatment N-L: Non-labeling

Problem 1

a. Look at the arrow. The arrow points to the right picture. Remember which picture is right. It will be right next time too! Now point to it.

b. Find the same one. Point to the same picture.

c. Find the same one. Point to it.

d. Same one this time. Point to it.

Problem 2

a. The arrow points to the right picture. It will be right next time too! Now point to it.

b. Find the same one. Point to the same picture.

c. Find the same one. Point to it.

d. Same one. Point.
Let's do another!

Problem 3

a. The arrow points to the right picture. Point to it.

b. Find the same one. Point to it.

c. Same one. Point.

d. Same one. Point.

(Instructions for Problem 3 are repeated for Problems 4-30.)

APPENDIX 3

Treatment O-L: Object Labeling

Problem 1

a. Look at the arrow. The arrow points to the right picture. Remember which picture is right. It will be right next time too! Its name is Cow. Say Cow. Now point to it.

b. Find the same one. Say Cow. Point to the same picture.

c. Find the same one. Say Cow. Point to it.

d. Same one this time. Say its name and point.

Problem 2

a. The arrow points to the right picture. It will be right next time too! Its name is Triangle. Say Triangle. Now point to it.

b. Find the same one. Say Triangle. Point to the same picture.

c. Find the same one. Say Triangle. Point to it.

d. Same one. Say its name and point.
Let's do another!

Problem 3

a. The arrow points to the right picture. Its name is Drum. Say Drum and point to it.

b. Find the same one. Say Drum and point to it.

c. Same one. Say its name and point.

d. Same one. Say its name and point.

(Instructions for Problem 3 are repeated for Problems 4-30, naming appropriate picture.)

APPENDIX 4

CRITERION TESTS FOR ATTRIBUTE LABELING STUDY

Posttest: (Day 3)

Problem 1

a. Look at the arrow. The arrow points to the right picture. Remember which picture is right. It will be right next time too! Now point to it.

b. Find the same one. Point to it.

c. Find the same one. Point to it.

d. Same one this time. Point.

e. Same one. Point.

Problem 2

a. The arrow points to the right picture. Point to it.

b. Find the same one. Point to it.

c. Same one. Point.

d. Same one. Point.

e. Same one. Point.

(Instructions for Problem 2 are repeated for Problems 3-12.)

Transfer Test: (Day 4)

Problem 1

a. Look at the arrow. The arrow points to the right picture. Remember which picture is right. It will be right next time too! Now point to it.

b. Find the same one. Point to it.

c. Find the same one. Point to it.

d. Same one this time. Point.

e. Same one. Point.

APPENDIX 4

Problem 2

a. The arrow points to the right picture. Point to it.

b. Find the same one. Point to it.

c. Same one. Point.

d. Same one.

e. Same one. Point.

(Instructions for Problem 2 are repeated for Problems 3-12.)

APPENDIX 5

READING POSTTEST

Item No.	Pupil Booklet			Commentary
1	pretty	mommy	Billy	Mark the word that says mommy.
2	in	are	run	Mark the word that says run.
3	Billy	cats	likes	Mark the word that says likes.
4	happy	baby	mommy	Mark the word that says happy.
5	in	is	was	Mark the word is.
6	kitchen	crying	children	Mark the word kitchen.
7	are	run	saw	Mark the word saw.
8	kitchen	children	cats	Mark the word children.
9	pretty	Billy	baby	Mark the word Billy.
10	the	saw	is	Mark the.
11	saw	and	was	Mark the word was.
12	run	in	is	Mark in.
13	crying	cats	kitchen	Mark the word crying.
14	was	a	and	Mark the word that says a.
15	fast	a	cats	Mark the word cats.
16	and	are	a	Mark the word and.
17	happy	crying	baby	Mark baby.
18	likes	fast	the	mark fast.

APPENDIX 5

Reading Posttest (continued)

Item No.	Pupil Booklet			Commentary
19	saw	the	are	Mark the word are.
20	pretty	happy	mommy	Mark the word pretty.
21	likes	Billy	baby	Now mark the word that is the name of a boy.
22	cats	fast	children	Mark the word that tells you what animals are soft and furry and say meow.
23	children	crying	kitchen	Mark the word that tells you in what room mommy cooks dinner.
24	pretty	baby	crying	Mark the word that tells you who is little and drinks milk from a bottle.
25	likes	happy	fast	Mark the word that tells how you feel when you get a present.
26	pretty	mommy	Billy	Mark the word that tells how a lady looks when she wears a new dress.
27	in	run	and	Mark the word that tells what children do when they want to get home in a hurry.
28	crying	baby	kitchen	Mark the word that tells what kind of noise a baby makes when he is hungry.
29	likes	cats	fast	Mark the word that tells how race cars go.
30	happy	children	mommy	Mark the word that tells you who gives that baby his bath.

APPENDIX 5

Reading Posttest (continued)

Item No.	Pupil Booklet				Commentary
31	(Picture: the baby is crying)*	(mommy)	(dog)	(baby crying)	Read the top words. Mark the picture that goes with the words.
32	(cats in the kitchen)	and the baby	in the kitchen	was the happy	Mark the word that tell you in what room the cats are playing.
33	(Billy and baby)	mommy is happy	Billy and a baby	the crying cats	Mark the word that tell you who mommy saw.
34	(children crying)	the children are crying	the baby is happy	mommy is happy	Mark the word that tell you what the children are doing.
35	(mommy and baby)	mommy likes the baby	in the kitchen	are the pretty	Mark the words that tell who mommy likes.
36	(children and cats drinking milk)	mommy likes Billy	the children saw the cats	the pretty mommy is	Mark the words that tell you what the children saw.
37	(children and cats running)	children and cats run fast	mommy was crying	Billy saw the baby	Mark the words that go with the picture.

---

*Words in parenthesis describe the picture on the page of the child's booklet.

APPENDIX 5

Reading Posttest (continued

Item No.	Pupil Booklet	Commentary
38	Billy was happy (cats run) (mommy and the baby) (Billy happy)	Read the words at the top - Now mark the picture that goes with the words.
39	mommy is pretty (children run) (cats drinking) (mommy)	Read the top words - Mark the picture that goes with the words.
40	Billy is in the kitchen (Billy in kitchen) (crying baby) (cats in kitchen)	Read the top words - Mark the picture that goes with the words.
41	Billy saw a happy likes baby run	Read the top words - There is a word missing - Mark the bottom word that goes with the top words.
42	the cats are in the is fast kitchen	Read the top words - There is a word missing - Mark the bottom word that goes with the top words.
43	mommy is Billy and pretty	Read the top words - There is a word missing - Mark the bottom word that goes with the top words.
44	the baby likes the in children was	Read the top words - There is a word missing - Mark the bottom word that goes with the top words.
45	Billy was crying are saw	Read the top words - There is a missing word - Mark the bottom word that goes with the top word.

APPENDIX 5

Reading Posttest (continued)

Item No.	Pupil Booklet			Commentary
46	run happy	kitchen	run	Mark the bottom word that is just the same as the top word.
47	is is	cats	baby	Mark the bottom word that is just the same as the top word.
48	children a	children	likes	Mark the bottom word that is just the same as the top word.
				OK boys and girls that's all for now - you've all done very well today.

APPENDIX 6

LIST OF ATTRIBUTES USED IN PROBLEMS

Animals

Giraffe
Monkey
Elephant
Camel
Squirrel
Bear
Lion
Tiger
Snake
Owl
Chicken
Duck
Cow
Horse
Pig
Cat
Dog
Turtle
Rabbit
Frog
Bees
Goat
Butterfly
Mouse
Spider
Fish
Turkey

Toys

Skates
Whistle
Blocks
Jack-in-box
Ball
Teddy Bear
Bat
Drum
Kite
Balloon
Ball
Wheels
Teepee
Leaf
Hammer

Parts of Body

Eye
Mouth
Ear
Hand
Foot

Transportation

Train
Motorcycle
Car
Truck
Wagon
Airplane
Boat
Bus
Bike

School Items

Crayons
Blackboard
Pencil
Book
Scissors
Ruler
Blocks
Flag
Piano

Food

Hamburger
Ice-cream Cone
Hot Dog
Pie
Sucker
Cupcake
Peanuts
Popsicle
Popcorn
Coke
Cake
Carrot
Bone

Playground

Slide
Swing
Rings
Ladder
Sandbox
Pail
Shovel

Clothing and Accessories

Coat
Dress
Cowboy
Hat
Belt
Tie
Shoes
Gloves
Umbrella
Shirt
Watch
Glasses
Earrings
Necklace
Policeman
Spaceman
Ribbon
Comb
Ring
Pants
Zipper

Furniture

Chair
Lamp
Table
Television
Bed
Radio
Bathtub
Telephone
Clock
Vacuum Cleaner

Kitchen

Stove
Refrigerator
Toaster
Plate
Cup
Glass
Spoon
Fork
Knife
Pot

Fruits and Vegetables

Apple
Banana
Grapes
Watermelon
Strawberries
Tomatoes
Carrot
Peaches

APPENDIX 7

RULE APPLICATION TEST

This test consisted of eight problems; two problems used each of the four conceptual rules selected. For each problem the child was first given a commentary which described a person, animal, or article to be found. Then the child was shown a set of five cards, on each of which appeared three pictures. (See sample card on next page.) The child was required to point to one picture per card. No knowledge of results was supplied. The commentary for each of the eight problems is given below; except for the first item for Problem 1, the five cards per problem are not shown.

Problem 1. Let's help Richard find his sweater. Richard's sweater has buttons and sleeves. He lost it at the grocery store. Point to the one that might be Richard's sweater. (A similar instruction to point was given for each of the four remaining items in the problem.)

Problem 2. Tony is looking for his Mother. She is somewhere at the beach. Tony's mother does not wear a watch. Point to the one that could be Tony's Mother.

Problem 3. Let's find the lady who drives the school bus. The lady bus-driver wears earrings or a necklace. She also has on boots. Point to the one on this page that could be the lady bus-driver.

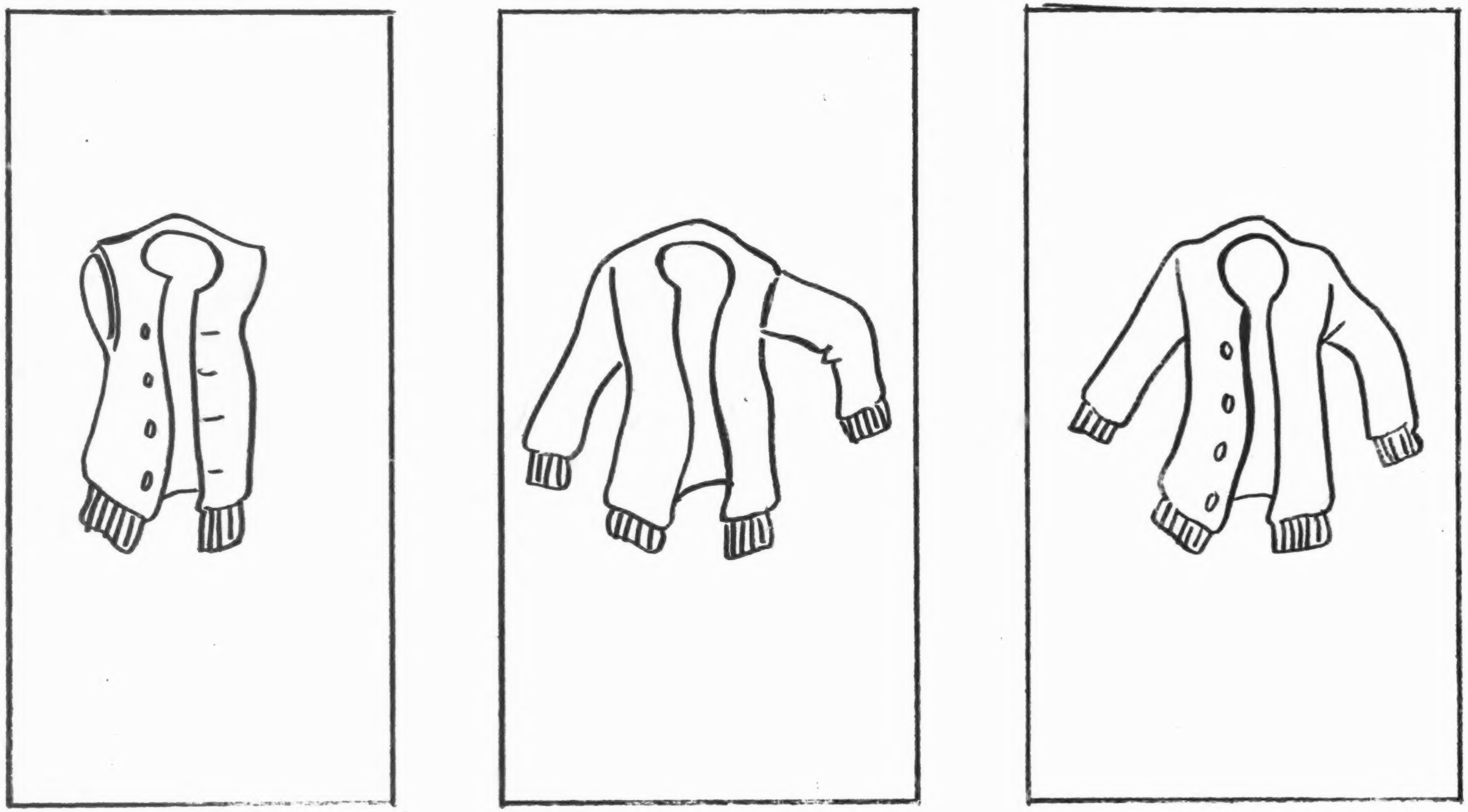
Problem 4. Let's find the pig that is named Fatso Pig. He likes to lie under the tree. Fatso Pig is wearing a bell and has spots. Find the one that could be Fatso Pig.

Problem 5. Let's find Jimmy's favorite birthday present. The birthday cake tasted good. Jimmy's favorite present has no wheels and no ribbon. Point to the one that could be Jimmy's favorite birthday present.

Problem 6. Let's find Betty's brother at the Holloween party. He has a knife in his pocket. Betty's brother is dressed like a policeman or a spaceman. Point to the one that might be Betty's brother.

Problem 7. Let's help Lilly find her purse. Lilly's purse has no handle and no zipper. It has a dollar bill in it. Find the one that might be Lilly's purse.

Problem 8. Who could be Edward's new teacher? The new teacher does not wear glasses. He has a ring on his finger. Point to the one that might be Edward's new teacher.



Sample Card for Rule Application Test

APPENDIX 8

CONCEPT IDENTIFICATION PROBLEM 1

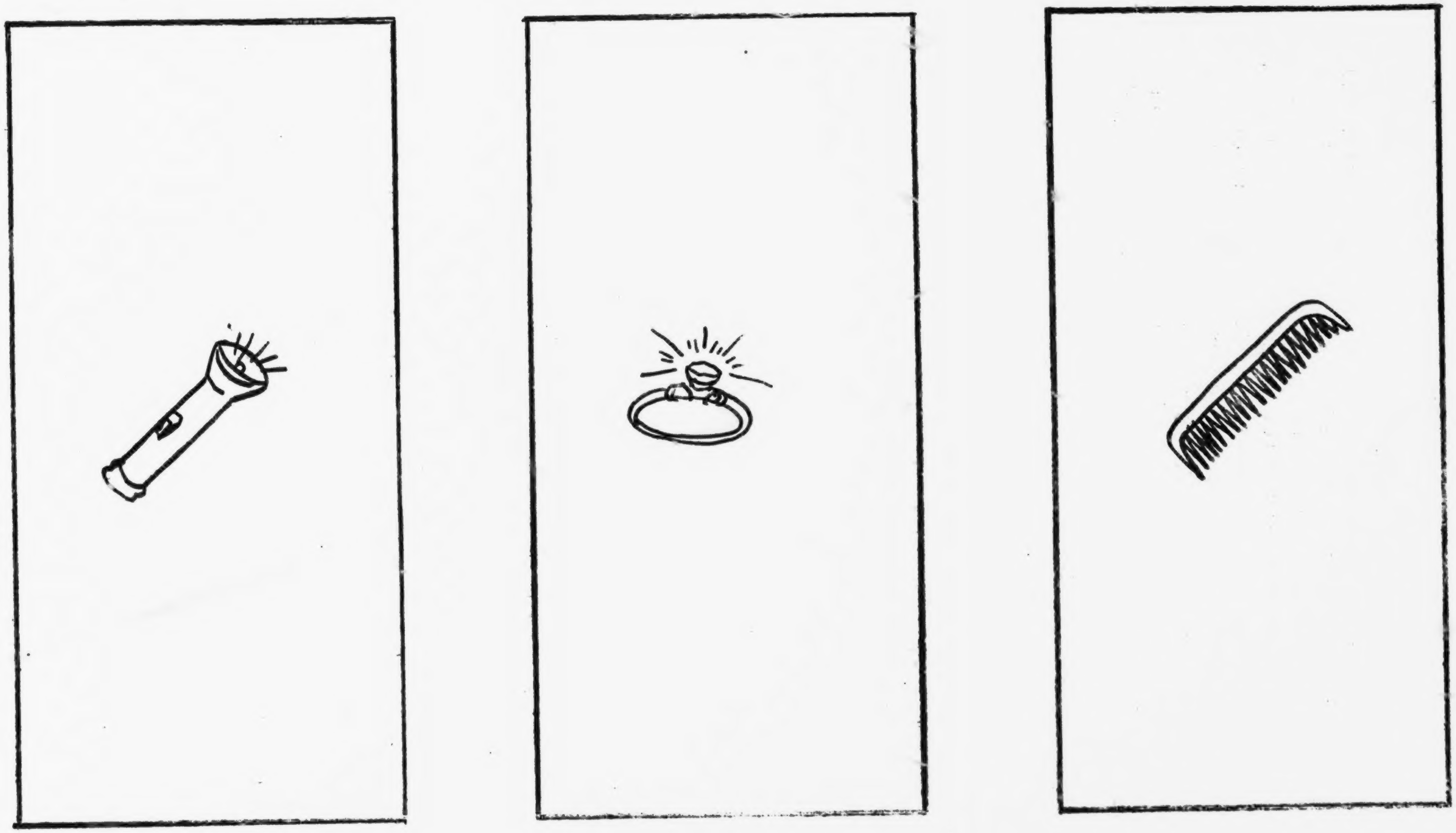
For this problem, the conceptual rule which the child had to discover was joint denial, specifically NOT THE COMB AND NOT THE RING. The commentary below was first read. The child was then shown a set of eight cards on each of which appeared three pictures, each card representing one three-choice item. The pictures used for each card or item are described below. On the following page appears the first card (Item 1) for this problem. The set of cards was shown the child as many times as necessary to reach the criterion of eight successive errorless trials, or, in the case of the child not achieving criterion, for 64 trials.

Commentary:

Mary Lou went shopping with her mother. They bought many things while they were downtown. I will show you some pictures and you can guess what Mary Lou and her mother bought. If you point to the right box, I will say, "Good, that's right." If you point to the wrong box, I will say, "No, that's wrong." We will keep playing until you guess the right pictures. I will say when to stop.

Pictures:

Item 1:	RING	COMB	FLASHLIGHT
Item 2:	COMB	UMBRELLA	RING
Item 3:	SAFETY PIN	RING	COMB
Item 4:	RING	COMB	FAUCET
Item 5:	COMB	RING	ARROW
Item 6:	FAN	COMB	RING
Item 7:	KEYS	COMB	RING
Item 8:	COMB	VIOLIN	RING



Sample Card for Concept Identification Problem 1.

3

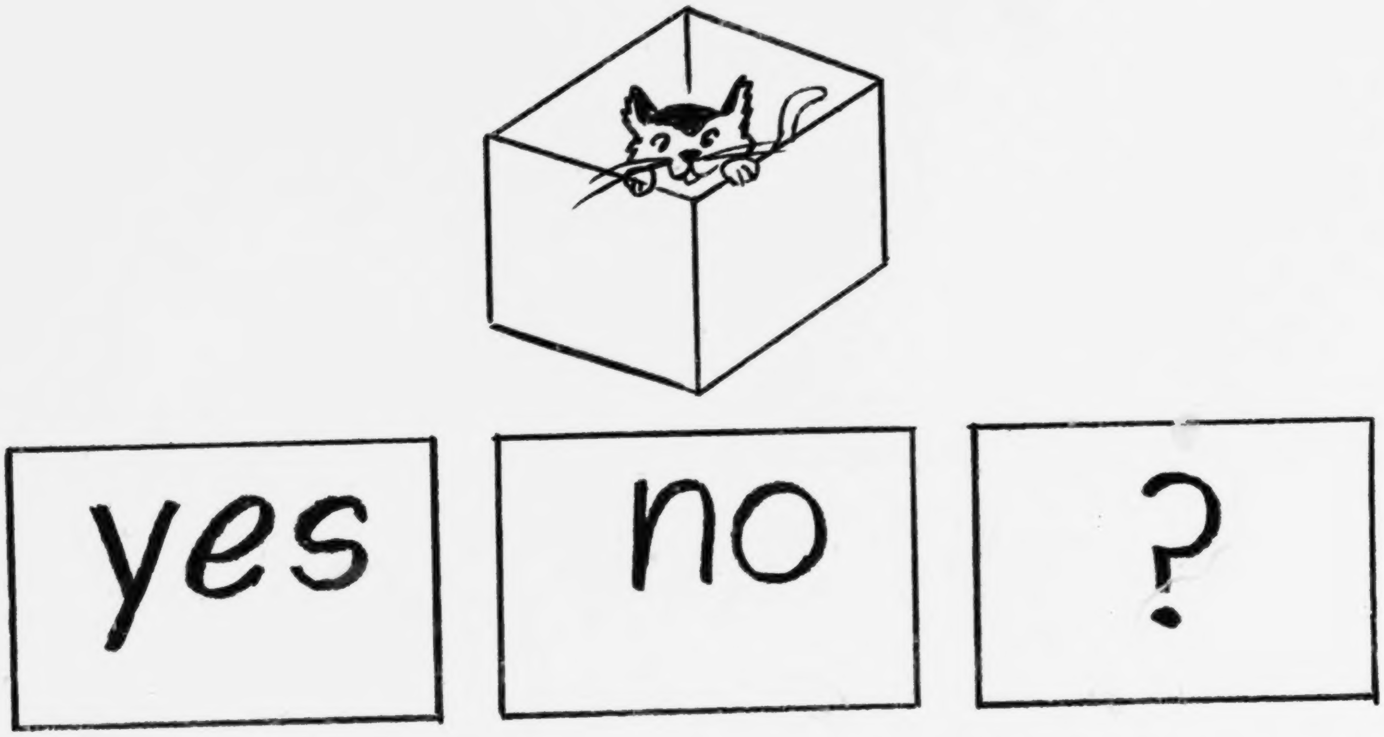
APPENDIX 9

RULE APPLICATION: SAMPLE OF A LESSON IN DISJUNCTION (P.1)

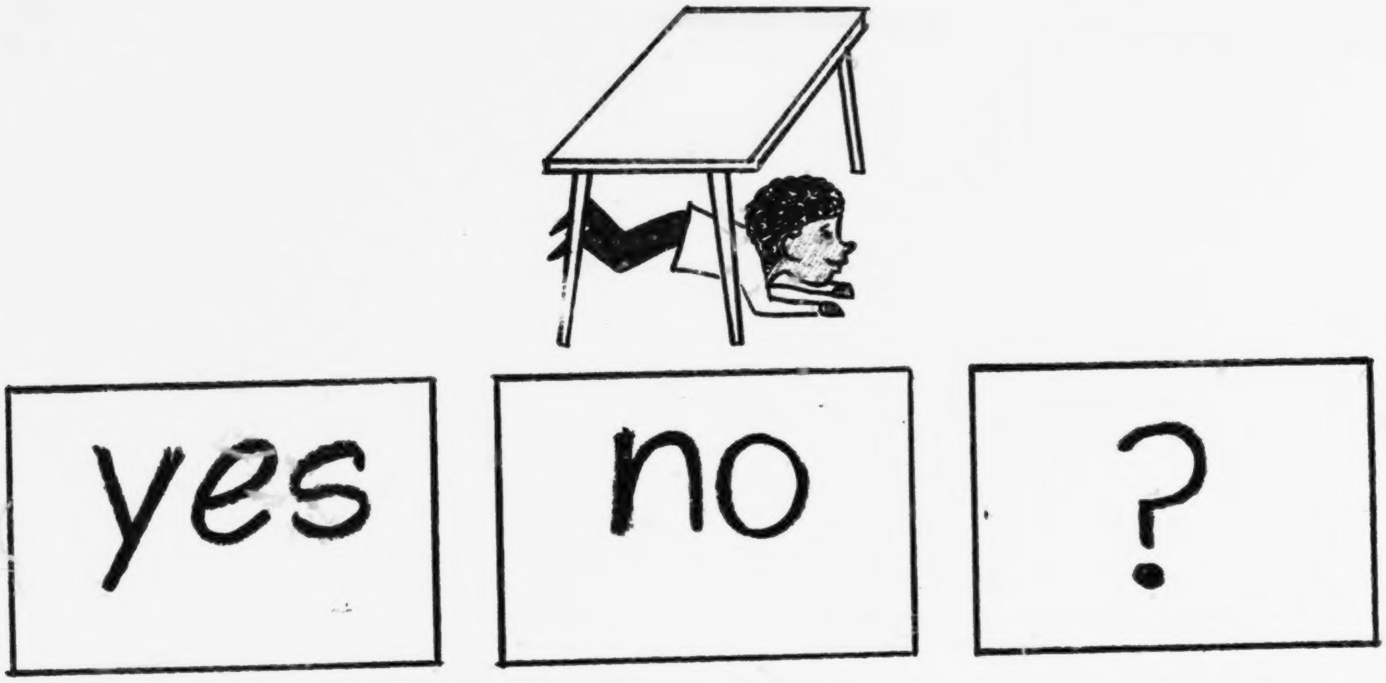
FRAME NO.	VISUAL			AUDITORY (TEACHER COMMENTARY)
				Introduction of Disjunction Story: Benny was a friendly mouse. He loved the children to hold him and to pet him. And, Benny thought his little cage was a nice home. But, one day Benny decided to run away. "I will come back," he said, "after I get tired of playing." And so, when Mother came to feed Benny, he hopped out of his cage and ran as fast as his legs could carry him. Mother ran after Benny.
				Set #1
1.				1. Where do you suppose Benny the Mouse is hiding? Mother chased Benny behind a toaster or a lamp. What's the rule?
2.	LAMP	RADIO	VACUUM CLEANER	2. Say the rule again: A toaster or a lamp. Find where Mother may have chased Benny.
3.	VACUUM CLEANER	TOASTER	RADIO	3. Say the rule again. Find where Mother may have chased Benny.
4.	LAMP	VACUUM CLEANER	RADIO	4. Say the rule again. Find where Mother may have chased Benny.
5.	RADIO	TOASTER	VACUUM CLEANER	5. Say the rule again. Find where Mother may have chased Benny.
				Set #2
6.				6. Let's find where Benny is hiding now. Benny ran under an umbrella or a bed. Say the rule.

RULE APPLICATION: SAMPLE OF A LESSON IN DISJUNCTION (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
7,	GLOVE UMBRELLA TABLE	7. Say it again: An umbrella or a bed. Point to where Benny may have run.
8.	BED GLOVE TABLE	8. Tell me the rule again. Show me where Benny may have run.
9.	GLOVE TABLE UMBRELLA	9. Say the rule again. Find where Benny may have run.
10.	TABLE GLOVE BED	10. What's the rule? Point to where Benny may have run.
11-15	Set #3 DRESS OR PIANO	
16-20	Set #4 TV OR CLOCK	
21-25	Set #5 CRAYONS OR FLAG	
		Conclusion of Disjunction Story: Mother reached for Benny but he slipped past and jumped out the window into the flower bed. "Benny! Benny!" Mother shouted. "You come back here." She looked and looked, but could not find Benny. Finally, Mother gave up and went home. What do you think she found when she got home? There was Benny all curled up in his little cage, sound asleep!



Text: Here is a cat in a box. Is there anything else in the box?



Text: This boy is hiding from his brother. Is he under the table?

APPENDIX 10

PHASE I: SAMPLE OF TYPICAL FRAMES

APPENDIX 11

LISTENING INFERENCE: POSTTEST (P.1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
1.	chair couch, kitten, whistle	1. (T. OPENS BOOKLET) Here is something we sit on. (T. POINTS TO CHAIR) Point to something else we sit on. (T. TURNS PAGE)
2.	boy reading book girl jumping rope, boy riding bike, girl reading book	2. (T. POINTS TO BOY READING BOOK) Here is a boy doing something. Point to the picture of someone else doing the same thing. (T. TURNS PAGE)
3.	bird YES NO ?	*3. Is this a rabbit? (T. TURNS PAGE)
4.	elephant with pail YES NO ?	4. Is the elephant holding a pail? (T. TURNS PAGE)
5.	truck YES NO ?	5. Are there toys in the truck? (T. TURNS PAGE)
6.	watering can YES NO ?	6. Lisa waters the flowers with this can. Does the can have water in it now? (T. TURNS PAGE)
7.	boy climbing stairs YES NO ?	7. Jimmy is going upstairs to see his sister. Is Jimmy going upstairs? (T. TURNS PAGE)
8.	cat with bag YES NO ?	8. There are no apples in this bag. Are there apples in this bag? (T. TURNS PAGE)
9.	3 blocks (all blue, some blue, no blue)	*9. Here are some blocks.
a.	YES NO ?	a. (T. LIFTS ALL BLUE BLOCK) This block has ALL blue sides. If I toss this block will I get blue?
b.	YES NO ?	b. (T. LIFTS SOME BLUE BLOCK) This block has SOME blue sides. If I toss this block will I get blue?
c.	YES NO ?	c. (T. LIFTS NO BLUE BLOCK) Here is a block with NO blue sides. If I toss this block will I get blue?

LISTENING INFERENCE: POSTTEST (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
10.	3-colored spinner	10. (T. TAKES OUT 3-COLORED SPINNER) Here is a spinner. When I spin the pointer like this, it will point to a color. (T. SPINS POINTER) Sometimes I will get purple, sometimes I will get green and sometimes I will get orange. (T. PUTS THIS SPINNER AWAY)
	3 spinners red yellow red and yellow	(T. TAKES OUT 3 RED AND YELLOW SPINNERS) Here are some other spinners. (T. POINTS TO ALL RED) This spinner has ALL red on it. (T. POINTS TO ALL YELLOW) This spinner has NO red on it. (T. POINTS TO YELLOW AND RED) This spinner has SOME red on it.
		a. Point to the spinner you would use if you SOMETIMES wanted to get red.
		b. Point to the spinner you would use if you ALWAYS wanted to get red.
		c. Point to the spinner you would use if you NEVER wanted to get red.
11.	cards	*11. (T. SHOWS BLANK SIDE OF ALL CARDS) Look at these cards. All the cards have pictures on the other side. (T. TURNS CARDS OVER) Here are some clowns, some fish, etc. (T. PICKS UP CARDS AND TURNS THEM OVER)
		a. ALL the pink cards have clowns on them. (T. POINTS TO A PINK CARD) Does this pink card have a clown on the other side?
		b. NONE of the green cards have clowns on them. (T. POINTS TO A GREEN CARD) Does this green card have a clown on the other side?
		c. SOME of the orange cards have clowns on them. (T. POINTS TO AN ORANGE CARD) Does this orange card have a clown on the other side?
		*Control group was instructed to answer Yes, No, or I can't tell.

APPENDIX 12

LISTENING COMPREHENSION: LESSON 6 (P.1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
1.	YES	1. This is the word that says YES. What does the word say? Mark the YES. BELL
2.	NO	2. This word says NO. What does the word say? Mark the NO. BELL
3.	?	3. This sign says CAN'T TELL. What does the sign say? Mark CAN'T TELL. BELL
4.	YES NO ?	4. Mark NO. BELL
5.	YES NO ?	5. Mark CAN'T TELL. BELL
6.	YES NO ?	6. Mark YES. BELL
7.	YES NO ?	7. Is it going to rain tomorrow? Mark CAN'T TELL. BELL
8.	YES NO ?	8. Do you eat soup with a spoon? Mark the dot. BELL
9.	YES NO ?	9. Does a horse sleep in your house? Mark the dot. BELL
10.	refrigerator YES NO ?	10. What is in the refrigerator? Mark the dot. BELL
11.	refrigerator YES NO ?	11. Is there milk in the refrigerator? Mark the dot. BELL
12.	refrigerator YES NO ?	12. Are there apples in this refrigerator? Mark the answer. Now let's open the door and see. BELL
13.	open refrigerator with apples, turkey, milk YES NO ?	13. Is there milk in this refrigerator? Mark the answer. BELL

LISTENING COMPREHENSION: LESSON 6 (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
14.	open refrigerator *YES* NO ?	14. Are there eggs in this refrigerator? Mark the answer. BELL
15.	open refrigerator *YES* NO ?	15. Are there apples in this refrigerator? Mark the answer. BELL
16.	open refrigerator YES *NO* ?	16. Is there a cake in the refrigerator? Mark the answer. BELL
17.	open refrigerator *YES* NO ?	17. Is there a turkey in the refrigerator? Mark the answer. BELL
18.	bird YES *NO* ?	18. Is this a rabbit? Mark the answer. BELL
19.	elephant with pail *YES* NO ?	19. Is the elephant holding a pail? Mark the answer. BELL
20.	elephant with pail YES NO *?*	20. Is there water in the elephant's pail? Mark the answer. BELL
21.	woman cooking YES NO *?*	21. Is the woman cooking vegetables? Mark the answer. BELL
22.	monkey with balloon *YES* NO ?	22. Is the monkey holding a balloon? Mark the answer. BELL
23.	truck YES NO *?*	23. Are there toys in the truck? Mark the answer. BELL
24.	hat YES *NO* ?	24. Is this a shoe? Mark the answer. BELL

APPENDIX 13

LESSON 17: LISTENING COMPREHENSION OF VERBAL QUANTIFIER SOME (ORAL-1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
	pond with green, orange and brown frogs	(T. HOLDS PICTURE UP) Here is a pond full of frogs. The frogs are different colors. Can you find some green frogs? (T. PICKS CHILD TO POINT TO GREEN FROGS) Find some orange frogs. (T. PICKS CHILD TO POINT) There are also come brown frogs. Can you find them? (T. PICKS CHILD TO POINT) Are ALL the frogs orange? Say: SOME are orange. Here is a rock in the pond. (T. POINTS) There is a frog hiding behind the rock. What is behind the rock? Is the frog behind the rock orange? Say: SOME are orange. (T. PASSES OUT BOOKLETS)
1.	YES NO ?	1. Open to the first page. Look up here. Are ALL of the frogs in the pond green? Say: SOME are green. Mark the answer. BELL
2.	YES NO ?	2. Look up here. Is the frog behind the rock green? Say: SOME are green. Mark the answer. BELL
3.	YES NO ?	3. Look up here. Are SOME of the frogs in the pond green? Say: SOME are green. Mark the answer. BELL
4.	YES NO ?	4. Is the frog behind the rock green? Say: SOME are green. Mark the answer. BELL Let's look. (T. LIFTS FLAP) What color is the frog?

LESSON 17: LISTENING COMPREHENSION OF VERBAL QUANTIFIER SOME (ORAL-2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
	farm with pigs, cow, ducks, turkey, haystack	(T. HOLDS PICTURE UP) Here is a farm with many kinds of animals. Can you find the pigs? (T. PICKS CHILD TO POINT) Find a turkey. (T. PICKS ONE CHILD) There are some ducks. Can you find them? (T. PICKS CHILD) There is also a cow. Find it. (T. PICKS CHILD) Are ALL the animals on the farm ducks? Say: SOME are ducks. (T. POINTS) Here is a haystack. There is an animal behind the haystack. What is behind the haystack? Is the animal behind the haystack a duck? Say: SOME are ducks.
5.	YES NO ?	5. Look up here. Are all the animals on the farm ducks? Say: SOME are ducks. Mark the answer. BELL
6.	YES NO ?	6. Is the animal behind the haystack a duck. Say: SOME are ducks. Mark the answer. Let's see. (T. LIFTS FLAP) What animal is it? BELL
	fish bowl: fish with green stripes, blue dots, orange squares, plain	(T. HOLDS PICTURE UP) Here is a bowl of fish. There are all kinds of fish in the bowl. See if you can find some fish with green stripes. (T. PICKS CHILD) Find some fish with blue dots. (T. PICKS ONE CHILD) There are also some fish with orange squares. Can you find them? (T. PICKS ONE CHILD) There are even some fish with no marks on them. They are plain. Find the plain fish. (T. PICKS ONE CHILD)
7.	YES NO ?	7. Do ALL the fish have green stripes? Say: SOME have green stripes. Mark the answer. BELL
8.	YES NO ?	8. Does the fish behind the rock have green stripes? Mark the answer. Let's see. (T. LIFTS FLAP) What does it have?

APPENDIX 13

LESSON 17: LISTENING COMPREHENSION OF VERBAL QUANTIFIER SOME (NON-ORAL-1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
	pond with green, orange and brown frogs	(T. HOLDS PICTURE UP) Here is a pond full of frogs. The frogs are different colors. Can you find some green frogs? (T. PICKS CHILD TO POINT TO GREEN FROGS) Find some orange frogs. (T. PICKS CHILD TO POINT) There are also some brown frogs. Can you find them? (T. PICKS CHILD TO POINT) Are ALL the frogs orange? Here is a rock in the pond. (T. POINTS) There is a frog hiding behind the rock. What is behind the rock? Is the frog behind the rock orange?
		(T. PASSES OUT BOOKLETS)
1.	YES NO ?	1. Open to the first page. Look up here. Are ALL of the frogs in the pond green? Mark the answer. BELL
2.	YES NO ?	2. Look up here. Is the frog behind the rock green? Mark the answer. BELL
3.	YES NO ?	3. Look up here. Are SOME of the frogs in the pond green? Mark the answer. BELL
4.	YES NO ?	4. Is the frog behind the rock green? Mark the answer. BELL Let's look. (T. LIFTS FLAP) What color is the frog?

LESSON 17: LISTENING COMPREHENSION OF VERBAL QUANTIFIER SOME (NON-ORAL-2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
	farm with pigs, cow, ducks, turkey, haystack	(T. HOLDS PICTURE UP) Here is a farm with many kinds of animals. Can you find the pigs? (T. PICKS CHILD TO POINT) Find a turkey. (T. PICKS CHILD) There are some ducks. Can you find them? (T. PICKS CHILD) There is also a cow. Find it. (T. PICKS CHILD) Are ALL the animals on the farm ducks? (T. POINTS) Here is a haystack. There is an animal behind the haystack. What is behind the haystack? Is the animal behind the haystack a cow?
5.	YES NO ?	5. Look up here. Are ALL the animals on the farm ducks? Mark the answer. BELL
6.	YES NO ?	6. Is the animal behind the haystack a duck? Mark the answer. Let's see. (T. LIFTS FLAP) What animal is it? BELL
	fish bowl: fish with green stripes, blue dots, orange squares, plain	(T. HOLDS PICTURE UP) Here is a bowl of fish. There are all kinds of fish in the bowl. See if you can find some fish with green stripes. (T. PICKS CHILD) Find some fish with blue dots. (T. PICKS CHILD) There are also some fish with orange squares. Can you find them? There are even some fish with no marks on them. They are plain. Find the plain fish. (T. PICKS CHILD)
7.	YES NO ?	7. Do ALL the fish have green stripes? Mark the answer. BELL (T. POINTS) Look up here. Here is a rock in the fish bowl. There is a fish behind the rock. What is behind the rock?
8.	YES NO ?	Does the fish behind the rock have green stripes? Mark the answer. Let's see. (T. LIFTS FLAP) What does it have?

APPENDIX 14

PATH GAME (ORAL-1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
	paths: boy to merry-go-round	(T. PASSES OUT PATHS AND CRAYONS) Here is Willie. Willie wants to get to the merry-go-round. Let's see which roads will take him to the merry-go-round. (T. POINTS TO ONE BLUE ROAD) Take your crayon and mark in this blue road. (T. CHECKS..... PAUSE) Does this blue road go to the merry-go-round? Now mark the other blue road. (T. CHECKS..... PAUSE) Does this blue road go to the merry-go-round? Do ALL the blue roads go to the merry-go-round? Say: SOME of the blue roads go to the merry-go-round. Do SOME of the blue roads go to the merry-go-round? Say: SOME blue roads go to the merry-go-round. If Willie walks on a blue road will he get to the merry-go-round? Say: Maybe. We CAN'T TELL. (T. POINTS TO ONE BROWN ROAD) Let's try the brown roads. Take your crayon and mark in this brown road. (T. CHECKS..... PAUSE) Does this brown road go to the merry-go-round? Now mark the other brown road. (T. CHECKS..... PAUSE) Does this brown road go to the merry-go-round? Do ALL the brown roads go to the merry-go-round? Say: NONE of the brown roads go to the merry-go-round. Do NONE of the brown roads go to the merry-go-round? Say: NO brown roads go to the merry-go-round. If Willie walks on a brown road will he get to the merry-go-round? If Willie walks on a blue road will he get to the merry-go-round?

PATH GAME (ORAL-2)

FRAME NO.	VISUAL			AUDITORY (TEACHER COMMENTARY)
				Let's try the yellow roads. Take your crayon and mark in this yellow road. (T. CHECKS) Does this yellow road go to the merry-go-round? (T. POINTS) Now mark the other yellow road. (T. CHECKS..... PAUSE) Does this yellow road go to the merry-go-round? Do ALL the yellow roads go to the merry-go-round? Say: ALL yellow roads go to the merry-go-round. If Willie walks on a yellow road, will he get to the merry-go-round? (T. PASSES OUT BOOKLETS) Here are your booklets. Open to the first page. Do ALL the blue roads go to the merry-go-round? Say: SOME blue roads go to the merry-go-round.
1.	YES	NO	?	1. If Willie walks on a blue road will he get to the merry-go-round? Mark the answer. BELL Do ALL the yellow roads go to the merry-go-round? Say: ALL yellow roads go to the merry-go-round.
2.	YES	NO	?	2. If Willie walks on a yellow road will he get to the merry-go-round? Mark the answer. BELL Do ALL the brown roads go to the merry-go-round? Say: NO brown roads go to the merry-go-round.
3.	YES	NO	?	3. If Willie walks on a brown road will be get to the merry-go-round? Mark the answer. BELL
4.	YES	NO	?	4. If Willie walks on a blue road will he get to the merry-go-round? Mark the answer. BELL
5-14.				5-14. (Similar to items 1-4 above)

PATH GAME (NON-ORAL 1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
	paths: boy to merry-go-round	(T. PASSES OUT PATHS AND CRAYONS) Here is Willie. Willie wants to get to the merry-go-round. Let's see which roads will take him to the merry-go-round. (T. POINTS TO ONE BLUE ROAD) Take your crayon and mark in this blue road. (T. CHECKS..... PAUSE) Does this blue road go to the merry-go-round? (T. POINTS) Now mark the other blue road. (T. CHECKS..... PAUSE) Does this blue road go to the merry-go-round? Do ALL the blue roads go to the merry-go-round? Do SOME of the blue roads go to the merry-go-round? If Willie walks on a blue road will he get to the merry-go-round? Let's try the brown roads. (T. POINTS) Take your crayon and mark in this brown road. (T. CHECKS..... PAUSE) Does this brown road go to the merry-go-round? (T. POINTS) Now mark the other brown road. (T. CHECKS.....PAUSE) Does this brown road go to the merry-go-round? Do ALL the brown roads go to the merry-go-round? Do NONE of the brown roads go to the merry-go-round? If Willie walks on a brown road will he get to the merry-go-round? If Willie walks on a blue road will he get to the merry-go-round? (T. POINTS) Let's try the yellow roads. Take your crayon and mark in this yellow road. (T. CHECKS..... PAUSE) Does this yellow road go to the merry-go-round? (T. POINTS) Now mark the other yellow road. (T. CHECKS.....PAUSE) Does this yellow road go to the merry-go-round? Do ALL the yellow roads go the the merry-go-round?

PATH GAME (NON-ORAL 2)

FRAME NO.	VISUAL			AUDITORY (TEACHER COMMENTARY)
				If Willie walks on a yellow road will he get to the merry-go-round? (T. PASSES OUT BOOKLETS) Here are your booklets. Open to the first page. Do all the blue roads go to the merry-go-round?
1.	YES	NO	?	1. If Willie walks on a blue road will he get to the merry-go-round? Mark the answer. BELL Do all the yellow roads go the merry-go-round?
2.	YES	NO	?	2. If Willie walks on a yellow road will he get to the merry-go-round? Mark the answer. BELL Do ALL the brown roads go to the merry-go-round?
3.	YES	NO	?	3. If Willie walks on a brown road will he get to the merry-go-round? Mark the answer. BELL
4.	YES	NO	?	4. If Willie walks on a blue road will he get to the merry-go-round? Mark the answer. BELL
5.	YES	NO	?	5. If Willie walks on a yellow road will he get to the merry-go-round? Mark the answer. BELL
6.	YES	NO	?	6. If Willie walks on a blue road will he get to the merry-go-round? Mark the answer. BELL
7-14.				7-14. (Similar to items 1-6 above)

APPENDIX 15

NATURE STUDY PROGRAM: SAMPLE LESSON (ORAL-1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
1.	car, submarine, plane	1. Hello, boys and girls. Remember me? I'm Captain Nemo. Come with Billy and Susie while I take them for another submarine ride. Open your booklets. Find the submarine and mark it. BELL
2.	coral	2. "Captain Nemo, I wonder what animals we'll see this time. Oh, look! What's that up ahead? It looks like a funny shaped rock," cried Susie. Why, that's some coral. What is it called, boys and girls? (coral) Mark the coral. BELL
3.	scallop, flower, coral	3. Coral is very sharp when you touch it. What is sharp when you touch it? (coral) Mark the coral. BELL
4.	coral, turtle, octopus	4. "Why is coral sharp?" asked Susie. Well, little sea animals put their shells together to make coral. Their shells are sharp. So coral is sharp, Susie. What do little animals make when they put their shells together? (they make coral) Mark the coral. BELL
5.	seahorse	5. "Oh," yelled Billy, "What's that strange looking animal over there, Captain Nemo?" That animal is called a seahorse. What is it called? (a seahorse) Mark the seahorse. BELL
6.	seahorse, horse, scallop	6. "I see why it's called a seahorse," said Billy. "It's head looks just like a horse's head." What animal's head looks like a horse's head? (a seahorse) Mark the seahorse. BELL

NATURE STUDY PROGRAM: SAMPLE LESSON (ORAL-2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
7.	seahorse on coral	7. "Look," shouted Susie. "The seahorse is hooking his tail around the coral." That's right, Susie. Seahorses like to hold onto coral with their tails. What animal likes to hold onto coral? (a seahorse) Mark the seahorse. BELL
8.	seahorse, fish on coral, seahorse on coral	8. When a seahorse gets tired of swimming he likes to swing on the coral. What does the seahorse like to swing on? (coral) Mark the seahorse who is swinging on the coral. BELL
9.	crab	9. "Captain Nemo, what is that animal near the coral called?" asked Billy. That's a crab. The crab lives in a shell and has two big claws. The claws are like hands. Who has two big claws? (crab) Mark the crab. BELL
10.	crab, scallop, snake	10. When the crab looks for a shell to live in, he looks for one just big enough for him to crawl into. Who looks for a shell to live in? (crab) Mark the crab. BELL
11.	crab by coral, crab by shell, seahorse on coral	11. But a crab grows just like you do. He grows bigger and bigger. Pretty soon he is too big for his shell. Then the crab has to find a new shell to live in. Who has to find a bigger shell to live in? (crab) Mark the crab crawling into a bigger shell. BELL

NATURE STUDY PROGRAM: SAMPLE LESSON (ORAL-3)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
12.	seahorse on jungle gym, seahorse on coral, snake on coral	12. "Where does the seahorse live?" The seahorse likes to live by the coral, Billy. He just hooks his tail onto a piece of coral and stays there at night. Who hooks his tail onto coral? (seahorse) Mark the seahorse on the coral. BELL
13.	spider, seahorse, crab	13. Look at the crab crawling into his shell. That's where he lives, remember? Who is crawling into the shell? (crab) Mark the crab.
14.	snail, crab with shell, turtle	14. "Hey, look!" shouted Billy. "It looks like the shell is moving away." It is, Billy. That's because the little crab is carrying the shell with him. What is the crab carrying with him? (shell) Mark the crab. BELL
15.	seahorse on coral, crab by flowers, crab on coral	15. "I wonder where the crab is going," said Susie. "It looks like he's going over there by the coral." Where is the crab going? (to the coral) Mark the crab near the coral. BELL
16.	coral, seahorse on coral, crab	16. "Hey, look!" yelled Billy. "There's the seahorse up above the crab." What is the seahorse hanging onto? (the coral) Mark the seahorse hanging onto the coral. BELL
17.	seahorse on coral, fish on coral, turtle on coral	17. The seahorse sure likes to hook his tail onto the coral and swing from it. Who swings on the coral? (the seahorse) Mark the seahorse. BELL I guess it's time to get back to land. "That was fun, Captain Nemo." Maybe we can come back again one day, Susie.

NATURE STUDY PROGRAM: SAMPLE LESSON (NON-ORAL 1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
1.	car, submarine, plane	1. Hello, boys and girls. Remember me? I'm Captain Nemo. Come with Billy and Susie while I take them for another submarine ride. Open your booklets. Find the submarine and mark it. BELL
2.	coral	2. "Captain Nemo, I wonder what animals we'll see this time. Oh, look! What's that up ahead? It looks like a funny shaped rock," cried Susie. Why, that's some coral. Boys and girls, is this called coral? (yes) Mark the coral. BELL
3.	scallop, flower, coral	3. Coral is very sharp when you touch it. Is coral sharp when you touch it? (yes) Mark the coral. BELL
4.	coral, turtle, octopus	4. "Why is coral sharp?" asked Susie. Well, little sea animals put their shells together to make coral. Their shells are sharp. So coral is sharp, Susie. When little animals put their shells together, do they make coral? (yes) Mark the coral. BELL
5.	seahorse	5. "Oh," yelled Billy, "What's that strange looking animal over there, Captain Nemo?" That animal is called a seahorse. Is it called a seahorse? (yes) Mark the seahorse. BELL
6.	seahorse, horse, scallop	6. "I see why it's called a seahorse," said Billy. "It's head looks just like a horse's head." Does a seahorse's head look like a horse's head? (yes) Mark the seahorse. BELL

NATURE STUDY PROGRAM: SAMPLE LESSON (NON-ORAL 2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
7.	seahorse on coral	7. "Look, shouted Susie. "The seahorse is hooking his tail around the coral." That's right, Susie. Seahorses like to hold onto coral with their tails. Does the seahorse like to hold onto coral with its tail? (yes) Mark the seahorse. BELL
8.	seahorse, fish on coral, seahorse on coral	8. When a seahorse gets tired of swimming he likes to swing on the coral. Does the seahorse like to swing on coral? (yes) Mark the seahorse who is swinging on the coral. BELL
9.	crab	9. "Captain Nemo, what is that animal near the coral called?" asked Billy. That's a crab. The crab lives in a shell and has two big claws. The claws are like hands. Does the crab have two big claws? (yes) Mark the crab. BELL
10.	crab, scallop, snake	10. When the crab looks for a shell to live in, he looks for one just big enough for him to crawl into. Does the crab look for a shell to live in? (yes) Mark the crab. BELL
11.	crab by coral, crab by shell, seahorse on coral	11. But a crab grows just like you do. He grows bigger and bigger. Pretty soon he is too big for his shell. Then the crab has to find a new shell to live in. Does the crab have to find a bigger shell to live in? (yes) Mark the crab looking for a new shell. BELL

NATURE STUDY PROGRAM: SAMPLE LESSON (NON-ORAL 3)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
12.	seahorse on jungle gym, seahorse on coral, snake on coral	12. "Where does the seahorse live?" The seahorse likes to live by the coral, Billy. He just hooks his tail onto a piece of coral and stays there at night. Does the seahorse hook his tail onto coral? (yes) Mark the seahorse on the coral. BELL
13.	spider, seahorse, crab	13. Look at the crab crawling into his shell. That's where he lives, remember? Is the crab crawling into the shell? (yes) Mark the crab. BELL
14.	snail, crab with shell, turtle	14. "Hey, look!" shouted Billy. "It looks like the shell is moving away." It is, Billy. That's because the little crab is carrying the shell with him. Is the crab carrying the shell with him? (yes) Mark the crab. BELL
15.	seahorse on coral, crab by flowers, crab on coral	15. "I wonder where the crab is going," said Susie. "It looks like he's going over there by the coral." Is the crab going over by the coral? (yes) Mark the crab near the coral. BELL
16.	coral, seahorse on coral, crab	16. "Hey, look!" yelled Billy. "There's the seahorse up above the crab." Is the seahorse hanging onto the coral? (yes) Mark the seahorse hanging onto the coral. BELL
17.	seahorse on coral, fish on coral, turtle on coral	17. The seahorse sure likes to hook his tail onto the coral and swing from it. Does the seahorse swing on the coral? Mark the seahorse. BELL I guess it's time to get back to land. "That was fun, Captain Nemo." Maybe we can come back again one day, Susie.

APPENDIX 16

NATURE STUDY PROGRAM: POSTTEST (P.1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
1.	cat	1. Hello, boys and girls. Open your booklets. Today we're going to mark with pencils. Mark a line through the cat like this. (T. DEMONSTRATES) BELL
2.	ball, dog, policeman	2. Now mark a line through the dog. BELL
3.	ball, car, plane	3. Mark a line through the car. BELL
4.	octopus, bee, seahorse	4. Mark a line through the octopus. BELL
5.	crab, bee, seahorse	5. Mark a line through the seahorse. BELL
6.	tentacle, beehive, coral	6. Mark a line through the coral. BELL
7.	tentacle, bee	7. Mark a line through the tentacle. BELL
8.	coral, scallop, honeycomb	8. Mark a line through the scallop. BELL
9.	bee, crab, octopus	9. Mark a line through the crab. BELL
10.	crab in beehive, crab in shell, octopus	10. The crab has grown too big for his old home. Mark what he would like for a new home. BELL
11.	octopus with scallop, octopus with flower, octopus on coral	11. If an octopus were very, very hungry, mark what he would like to eat. BELL
12.	crab's claw, coral, octopus' tentacle	12. Mark what the octopus uses to put his favorite food in his mouth. BELL
13.	octopus crying, octopus resting, octopus in cloud of ink	13. Whrrrrr. A noisy motorboat has scared the octopus. Mark what he does to hide. BELL

NATURE STUDY PROGRAM: POSTTEST (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
14.	seahorse on coral, seahorse on hive, seahorse on fish	14. The little seahorse has been swimming for a long time. Now he's very tired. Mark what he would hang from to rest. BELL
15.	octopus in resting hole, octopus by coral, octopus on bed	15. Mark the place where the octopus goes when he wants to rest and be quiet. BELL
16.	snails, honeycomb, coral	16. When lots of little sea animals put their shells together, they make something. Mark what they make. BELL
17.	seahorse, octopus, fish	17. Mark a line through the animal who has a head like a horse. BELL
18.	crab, scallop, octopus	18. Mark the animal who crawls all the way into its shell when it is frightened. BELL
19.	octopus with scallop, octopus swimming, octopus walking	19. Mark the octopus who is swimming. BELL
20.	bird, boat, hamburger	20. Mark the bird. BELL
21.	airplane, dog, bicycle	21. Mark the airplane. BELL

APPENDIX 17

RULE APPLICATION: SAMPLE LESSON (ORAL-1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
		Today we're going to mark the dot just once on each page with our pencil. Cheryl is looking for her teacher. Let's help her find the teacher. Cheryl says her teacher does not wear glasses and has a striped dress. Remember to say the clue. (The clue is No glasses and striped dress.) Turn the page.
1.	T. with glasses and striped dress, T. with plain dress, T. with striped dress	1. Mark the one that could be Cheryl's teacher. (PAUSE) But Cheryl says she's not on this page. Let's look some more..... Say the clue..... Turn the page.
2.	T. with striped dress, T. with dotted dress, T. with glasses and plain dress	2. Mark the one that could be Cheryl's teacher. (PAUSE) But Cheryl says she's not on this page. Let's look some more..... Did you say the clue?..... Turn the page.
3.	T. with glasses and flora dress, T. with striped dress, T. with glasses and striped dress	3. Mark the one that could be Cheryl's teacher. (PAUSE) But Cheryl says she's not on this page. Let's look some more.....Did you say the clue?..... Turn the page.
4.	T. with patterned dress, T. with glasses and plain dress, T. with striped dress	4. Mark the teacher. Hurrah! That one is Cheryl's teacher. "Hello, Cheryl," said the teacher. "We're going to have a pet show. Come in and help us. Now, who has an animal they'd like to bring to our pet show?" "I have," said Ronald. "Good," the teacher said. "Tell us something about your pet." "Listen," Ronald said, "And I'll tell you the clue. My pet has two legs and likes water." Say the clue..... (The clue is two legs and likes water.) Turn the page.

RULE APPLICATION: SAMPLE LESSON (ORAL-2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
5.	octopus, penguin, lamb	5. Mark the one that could be Ronald's pet. (PAUSE) But Ronald says his pet is not on this page. Let's look some more. Turn the page.
6.	alligator, fish in bowl, bird by bird bath	6. Mark the one that could be Ronald's pet. (PAUSE) But Ronald says his pet is not on this page. Let's look some more. Turn the page.
7.	pelican by water, dog on beach, turtle	7. Mark the pet. (PAUSE) But Ronald says his pet is not on this page. Let's look some more. Turn the page.
8.	duck by water, frog on rock in water, scallop	8. Mark the pet. Hurrah! That one is Ronald's pet. It's a duck.
		The teacher asked, "Does anyone else have a pet to bring to our pet show?" "I have, I have!" Lauren called out. "I'll tell you something about my pet. Here's the clue: He has curly hair and wears a bell." Say the clue..... (The clue is curly hair and bell.)
		Turn the page.
9.	fish, rabbit with bell, dog with curly hair and bell	9. Mark the one that could be Lauren's pet. (PAUSE) But Lauren says her pet is not on this page. Let's look some more..... Remember the clue....Turn the page.
10.	pig with bell, beaver with curly hair and bell, duck	10. Mark the one that could be Lauren's pet. (PAUSE) But Lauren says her pet is not on this page. Let's look some more. Turn the page.
11.	monkey with bell, bird, cat with curly hair and bell	11. Mark the pet. (PAUSE) But Lauren says her pet is not on this page. Let's look some more. Turn the page.

RULE APPLICATION: SAMPLE LESSON (ORAL-3)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
12.	deer with bell, lamb with curly hair and bell, turkey	12. Mark the pet. Hurrah! That one is Lauren's pet. It's a lamb.
		"Now, does anyone else have a pet to bring to our pet show," asked the teacher. "I do," said Marvin. "And I'll tell you something about my pet. He wears a collar and does not have a short tail." Say the clue..... (The clue is collar and NO tail.)
		Turn the page.
13.	cat with long tail and collar, pig with short tail and collar, mouse with long tail	13. Mark the one that could be Marvin's pet. (PAUSE) But Marvin says his pet is not on this page. Let's look some more. Turn the page.
14.	goat with short tail and collar, monkey with long tail and collar, seahorse with long tail	14. Mark the one that could be Marvin's pet. (PAUSE) But Marvin says his pet is not on this page. Let's look some more. Turn the page.
15.	squirrel with long tail and collar, dog with short tail, lamb with short tail and collar	15. Mark the pet. (PAUSE) But Marvin says his pet is not on this page. Let's look some more. Turn the page.
16.	dog with short tail, rabbit with short tail and collar, dog with long tail and collar	16. Mark the pet. Hurrah! That one is Marvin's pet. It's the dog.
	classroom pet show	(T. HOLDS UP PICTURE) Everyone look up here. Now we're ready for the pet show!

RULE APPLICATION: SAMPLE LESSON (NON-ORAL 1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
		Today we're going to mark the dot just once on each page with our pencil. Cheryl is looking for her teacher. Let's help her find the teacher. Cheryl says her teacher does not wear glasses and has a striped dress. Remember, the clue is NO glasses and striped dress. Turn the page.
1.	T. with glasses and striped dress, T. with plain dress, T. with striped dress	1. Mark the one that could be Cheryl's teacher. (PAUSE) But Cheryl says she's not on this page. Let's look some more. Turn the page.
2.	T. with striped dress, T. with dotted dress, T. with glasses and plain dress	2. Mark the one that could be Cheryl's teacher. (PAUSE) But Cheryl says she's not on this page. Let's look some more. Turn the page.
3.	T. with glasses and floral dress, T. with striped dress, T. with glasses and striped dress	3. Mark the one that could be Cheryl's teacher. (PAUSE) But Cheryl says she's not on this page. Let's look some more. Turn the page.
4.	T. with patterned dress, T. with glasses and plain dress, T. with striped dress	4. Mark the teacher. Hurrah! That one is Cheryl's teacher. "Hello, Cheryl," said the teacher. "We're going to have a pet show. Come in and help us. Now, who has an animal they'd like to bring to our pet show?" "I have," said Ronald. "Good," the teacher said. "Tell us something about your pet." "Listen," said Ronald, "And I'll tell you the clue. My pet has two legs and likes water." Turn the page.

RULE APPLICATION: SAMPLE LESSON (NON-ORAL 2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
5.	octopus, penguin, lamb	5. Mark the one that could be Ronald's pet. (PAUSE) But Ronald says his pet is not on this page. Let's look some more. Turn the page.
6.	alligator, fish in bowl, bird by bird bath	6. Mark the one that could be Ronald's pet. (PAUSE) But Ronald says his pet is not on this page. Let's look some more. Turn the page.
7.	pelican by water, dog on beach, turtle	7. Mark the pet. (PAUSE) But Ronald says his pet is not on this page. Let's look some more. Turn the page.
8.	duck by water, frog on rock in water, scallop	8. Mark the pet. Hurrah! That one is Ronald's pet. It's a duck. The teacher asked, "Does anyone else have a pet to bring to our pet show?" "I have, I have!" Lauren called out. "I'll tell you something about my pet. Here's the clue: He has curly hair and wears a bell." Turn the page.
9.	fish, rabbit with bell, dog with curly hair and bell	9. Mark the one that could be Lauren's pet. (PAUSE) But Lauren says her pet is not on this page. Let's look some more. Turn the page.
10.	pig with bell, beaver with curly hair and bell, duck	10. Mark the one that could be Lauren's pet. (PAUSE) But Lauren says her pet is not on this page. Let's look some more. Turn the page.
11.	monkey with bell, bird, cat with curly hair and bell	11. Mark the pet. (PAUSE) But Lauren says her pet is not on this page. Let's look some more. Turn the page.

RULE APPLICATION: SAMPLE LESSON (NON-ORAL 3)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
12.	deer with bell, lamb with curly hair and bell, turkey	12. Mark the pet. Hurrah! That one is Lauren's pet. It's a lamb. "Now, does anyone else have a pet to bring to our pet show," asked the teacher. "I do," said Marvin. "And I'll tell you something about my pet. He wears a collar and does not have a short tail." Turn the page.
13.	cat with long tail and collar, pig with short tail and collar, mouse with long tail	13. Mark the one that could be Marvin's pet. (PAUSE) But Marvin says his pet is not on this page. Let's look some more. Turn the page.
14.	goat with short tail and collar, monkey with long tail and collar, seahorse with long tail	14. Mark the one that could be Marvin's pet. (PAUSE) But Marvin says his pet is not on this page. Let's look some more. Turn the page.
15.	squirrel with long tail and collar, dog with short tail, lamb with short tail and collar	15. Mark the pet. (PAUSE) But Marvin says his pet is not on this page. Let's look some more. Turn the page.
16.	dog with short tail, rabbit with short tail and collar, dog with long tail and collar	16. Mark the pet. Hurrah! That one is Marvin's pet. It's the dog.
	classroom pet show	(T. HOLDS UP PICTURE) Everyone look up here. Now we're ready for the pet show!

APPENDIX 18

RULE APPLICATION: POSTTEST (P.1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
A.	cat, elephant	A. Here is a picture of a cat and an elephant. The elephant has a line through it. Now you mark a line through the elephant. Turn the page.
		Richard has lost his sweater. He tells us it has buttons and a patch on the sleeve.
1a.	sweater with no buttons and patch on sleeve, sweater with buttons, sweater with buttons and patch on sleeve	1a. Mark a line through the sweater that could be Richard's. (PAUSE FOR CHILD TO MARK) Richard says his sweater is not on this page. Let's look some more. Turn the page.
b.	sweater with buttons and patch on sleeve, sweater with buttons and patch on front, sweater with no buttons and no patch	b. Mark the sweater that could be Richard's. (PAUSE) Richard says his sweater is not on this page. Let's look some more. Turn the page.
c.	sweater with no buttons and no patch, sweater with buttons and patch on sleeve, sweater with buttons	c. Oh, boy! Richard says his sweater is on this page. Mark Richard's sweater. Turn the page.
		Listen carefully. The rest of the questions are just like the first one. Tony is looking for his aunt. She is wearing earrings and NO hat.
2a.	woman with earrings and hat, woman with earrings, woman with hat	2a. Mark the woman who could be Tony's aunt. (PAUSE) Tony says his aunt is not on this page. Let's look some more. Turn the page.
b.	woman with earrings, woman with earrings and hat, woman with hat	b. Mark the woman who could be Tony's aunt. (PAUSE) Tony says his aunt is not on this page. Let's look some more. Turn the page.

RULE APPLICATION: POSTTEST (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
d.	woman with earrings and hat, woman with hat, woman with earrings	d. Tony says his aunt is on this page. Mark Tony's aunt. Turn the page.
		Lillian lost her purse. Let's help her find it. She says her purse has two handles and no buckle.
3a.	purse with 2 handles and buckle, purse with buckle, purse with 2 handles	3a. Which of these could be hers? Mark a line through it. (PAUSE) Lillian says her purse is not on this page. Let's look some more. Turn the page.
b.	purse with 2 handles, purse purse with 2 handles and buckle, purse with buckle	b. Mark the purse that could be Lillian's. (PAUSE) Lillian says her purse is not here. Let's look some more. Turn the page.
c.	purse with 1 handle, purse with 1 handle and buckle, purse with 2 handles	c. Mark the purse that could be Lillian's. (PAUSE) Lillian says that's not her purse. Let's look some more. Turn the page.
d.	purse with 1 handle, purse with 2 handles, purse with one handle and buckle	d. Lillian says her purse is on this page. Mark Lillian's purse. Turn the page.
		Jimmy has a surprise. He got a present for his birthday. Let's see if we can find out what it is. Jimmy says his present has NO wheels and is NOT something to wear.
4a.	boot, football, wagon	4a. Which of these could be Jimmy's present? Mark a line through it. (PAUSE) Jimmy says his present is not here. Let's look some more. Turn the page.
b.	kite, shoe, truck	b. Which of these could be Jimmy's present? Mark a line through it. (PAUSE) Jimmy says his present is not here. Let's look some more. Turn the page.

RULE APPLICATION: POSTTEST (P.3)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
c.	shirt, bat, bus	c. Which of these could be Jimmy's present? Mark a line through it. (PAUSE) Jimmy says that's not it. Let's look some more. Turn the page.
d.	hat, car, boat	d. Jimmy says his present is on this page. Mark Jimmy's present. Turn the page.
		Betty's sister is all dressed up for Halloween. She is wearing a pointed hat OR a dotted dress.
5a.	girl with striped dress, girl with pointed hat, girl with flat top hat	5a. Which of these could be Betty's sister? Mark a line through her. (PAUSE) Betty says that's not her sister. Let's look some more. Turn the page.
b.	girl with plain dress, girl with striped dress and rounded hat, girl with dotted dress and flat top hat	b. Which of these could be Betty's sister? Mark a line through her. (PAUSE) Betty says her sister is not here. Let's look some more. Turn the page.
c.	girl with dotted dress, girl with plain dress, girl with plain dress and flat top hat	c. Which of these could be Betty's sister? Mark a line through her. (PAUSE) Betty says that's not her sister. Let's look some more. Turn the page.
d.	girl with plain dress and rounded hat, girl with striped dress, girl with striped dress and pointed hat	d. Betty says her sister is on this page. Mark Betty's sister.

APPENDIX 19

LISTENING TEST I: USING INFORMATION (P.1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
		Here are some questions. Answer them YES, NO, or CAN'T TELL.
1.		1. I have something in my purse. Is it a sandwich? Answer YES, NO, or CAN'T TELL.
2.		2. I saw something on the street this morning. Was it a horse? Answer YES, NO, or CAN'T TELL.
3.		3. I have a toy in my purse. It is lots of fun. Do I have a toy? Answer YES, NO, or CAN'T TELL.
4.		4. I'm going to tell you about Spot. Listen and see if Spot has long ears. Spot is a little dog with long legs. Does Spot have long ears?
5.		5. I'm going to tell you about a zoo. Listen and see if there are balloons at this zoo. This is a very large zoo. It has many animals. Does the zoo have balloons?
6.		6. I'm going to tell you about a playground. Listen and see if the playground has swings. Linda lives near a playground. There are many swings in the playground. Does the playground have swings?
7.		7. I'm going to tell you about a rabbit. Listen and see if the rabbit likes lettuce. A rabbit lives behind Sally's house. The rabbit doesn't like lettuce. Sally feeds the rabbit carrots. Does the rabbit like lettuce?

LISTENING TEST I: USING INFORMATION (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
8.		8. I'm going to tell you about Johnny. Listen and see if Johnny has a baby sister. Johnny lives in a blue house. He rides a bicycle. Does Johnny have a baby sister?
9.		9. I'm going to tell you about a turtle. Listen and see if the turtle likes to swim. One day Marvin was walking on the beach and found a turtle. The turtle had a big shell and liked to swim. Marvin named the turtle Tommy. Does Tommy the turtle like to swim?
10.		10. I'm going to tell you about Felix. Listen and see if Felix has stripes. Felix is Marie's kitten. Felix is soft and furry. He has NO stripes. Marie and Felix like to play together. Does Felix have stripes?
11.		11. I'm going to tell you about a car. Listen and tell me what color the car is. The car belongs to Mr. Jones who is in the green house. He has a yellow bicycle and he rides in his car to work. Is the car green?

LISTENING TEST II: FOLLOWING DIRECTIONS (P.1)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
1.	chair, slide, dog, elephant, TV, house	1. Here is a booklet. Find the dog and draw a circle around it. Now find the elephant and draw a line through it. Turn the page.
2.	boy with toys, teddy bear, boy under chair, motorcycle, girls with doll, elephant	2. Look at each picture. If it's a child draw a circle around it. When you're through, turn the page and keep marking.
3.	lamp, frog, boy with truck, girls with blocks, boy with blocks, watermelon	
4.	boat, boy jumping, boy at table, tree, rabbit, boy with toys	
	white blank page	White page means stop. Turn the page.
5.	hamburger, chair, banana, telephone, doll, sucker	5. Now if it is NOT food, draw a line through it. Stop at the white page.
6.	balloon, block, apple, cupcake, bed, hot dog	
7.	shoe, ice cream cone, cake, fireman, soup, boy	
	white page	Turn the page.

LISTENING TEST II: FOLLOWING DIRECTIONS (P.2)

FRAME NO.	VISUAL	AUDITORY (TEACHER COMMENTARY)
8.	buggy, dress, bus, boot, wheelbarrow, pants	8. If it is something to wear, draw a circle around it; if it has wheels, draw a line through it. Stop at the white page.
9.	shoe, moving van, hat, wagon, sock, truck	
10.	bear on bike, sweater, car, cowboy hat, train, jacket	
	white page	Turn the page.
11.	goat, bottle, turtle, shirt, lion, broom	11. If it's an animal, draw a circle around it; if it's something that has NO legs, draw a line through it.
12.	football, turkey, plane, horse, tree, rabbit	
13.	dog, baby bottle, elephant, hammer, dog, leaf	